

## Redundancy formula is near

by David Jobbins  
A compromise deal which could end the doubts over the status of the redundancy procedures agreement for college lecturers is believed to be near.

The initiative came from education authority employers' officials and was instrumental in overruling the National Association for Teachers in Further and Higher Education towards withdrawal from the national joint council on conditions of service.

The compromise being explored by officials from both sides will have the effect of emphasizing that the agreement, reached between Natfhe and the Council for Local Education Authorities in the mid-1970s, is binding on all the authorities who have already operated it, or indicated that they would.

Negotiations on the position of

the remaining 20 or so who have balked at the agreement would continue.

The deal would preserve the cardinal point for the union side that the great majority of the 104 authorities would be bound to honour the one-year notice of redundancy specified in the agreement with CLEA. The advantage to the management side is that it would remove an area of deep-seated doubt among lecturers at the ability of the NJC to act as an authoritative negotiating forum.

It would also remove the basis from which union negotiators are likely to seek a range of further—and as vital—in the event of redundancy, covering all education authorities. The deteriorating picture of possible redundancies has demonstrated lack of uniformity nationally on issues which do not bear on the right of notice, such as deter-

mination of redundancy and selection of individuals.

The proposal is that while the agreement would remain appendices of the codified document setting out lecturers' conditions of service, the main text would make clear that it is a recommendation accepted as binding by a specified number of authorities.

Obviously, lists of those authorities which had or had not ratified the earlier agreement would be needed—and these could be referred to in the document and kept up to date by officials from both sides.

Lecturers at North Staffordshire Polytechnic have called off the half-day strike planned for yesterday when plans for up to 42 redundancies were withdrawn by polytechnic governors and the education authority.

## OU to negotiate for new funding of enterprises

The Open University is to negotiate with the Department of Education and Science for a new method of funding its world-wide marketing organization and publishing company.

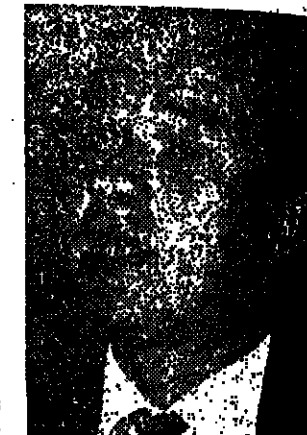
The university senate decided this week that this is essential if Open University Educational Enterprises Ltd is to keep going. The decision follows recommendations made by a review group set up by the council to look into the company's operation and future.

The company, which has an annual turnover of about £1m, sells OU course materials—books, films and tapes—both at home and in 80 countries overseas.

Last year it suffered a disastrous 62 per cent drop in net profits from £161,000 in 1978 to £60,000. However, the company's longer term position has been strengthened by the winning of a contract to distribute the entire output of the Central Statistical Office which will add £400,000 to the annual turnover and £85,000 to its net profits.

A crucial aspect of the renegotiation is the university's desire to end OUEE's present requirement to hand over all its taxable profits to the university. This deprives the company of working capital which could be used to offset the effects of inflation or undertake new developments.

The senate meeting also approved a council proposal to redivertise for a new secretary following a



Lord Perry: outgoing chancellor.

three month constitutional dispute. The job was offered to Sir J. Bosworth, registrar of Salts, who was only weeks away from leaving the university.

John Horlock—also from Salts University—was appointed as vice-chancellor of the OU. The appointment was blocked by the senate on the grounds of inadequate consultation.

The senate meeting had decided to act on certain changes in the structure and function of the OU proposed by the outgoing vice-chancellor Lord Perry.

## Talks begin on CLEA proposals

by John O'Leary

A group of civil servants and local authority representatives have begun discussions which could lead to fundamental changes in the running of colleges and polytechnics.

Dr Rhodes Boyson, under-secretary for higher education, has set up the consultative group to make recommendations on the need for changes in instruments and articles of government following representations from the Council of Local Education Authorities.

A CLEA paper on the subject caused uproar earlier in the year when it claimed that some polytechnic directors had indulged in "luxury spending" and had a lifestyle more lavish than most university vice-chancellors.

It called for reserve powers for local authorities to allow them to intervene in the detailed financial administration of their institutions where there was evidence of malad-

ministration and to assume direct powers in the approval of courses, rather than simply determining "general educational character".

Other moves were advocated to permit budget changes in mid-year and to make authorities the legally undisputed employers of college and polytechnic staff, giving them responsibility for discipline, health and safety, redeployment and redundancy. College constitutions, now the responsibility of the Department of Education and Science, would also be brought under the authorities' control.

CLEA told Dr Boyson that local authorities did not want to take over day-to-day running of their institutions but that existing articles of government stood in the way of effective management in higher education.

A preliminary meeting of the consultative group, held last week, discussed CLEA's proposals, but is unlikely to reach any conclusions

this year. It will decide whether any changes are required before setting out the format for the rest of the inquiry.

Dr Boyson has already sounded out college principals and polytechnic directors on the subject and promised to consult them further if new instruments and articles are proposed. They have declared their opposition to CLEA's plans and are likely to have the support of the Society of Education Officers, whose members understand to be generally satisfied with their current powers.

A Committee of Directors of Polytechnics' official said this week: "We are not enthusiastic about changes per se and would be very anxious indeed if there were substantial changes along the lines CLEA suggests. We are going to make a further submission to Dr Boyson and we would expect to be involved in any more detailed consultations."

## 1979 overseas figures fall

The numbers of overseas students entering universities fell in 1979 for the first time in many years, after doubling in less than ten years, according to statistics released last week by the Department of Education and Science.

There was a five per cent fall in new overseas university students last year, with undergraduates showing the most marked decrease. But between 1969 and 1979 the overseas student total more than doubled while the number of home students increased by 26 per cent. The figures show that the overseas shares of the undergraduate and postgraduate populations have risen from 4 per cent to 7 per cent, and from 25 per cent to 35 per cent respectively.

The last ten years has also seen a huge increase in female students compared with men, a rise of 70 per cent for female undergraduates from 1969 to 1979, and of 14 per cent for men. As a percentage of the total number of undergraduates, numbers of women has gone from 30 to 39 per cent in the last ten years, and from 24 to 35 per cent for postgraduates.

## New moves in closed shop row

Leeds Polytechnic director Dr Patrick Nutgens is backing moves to force a fresh test of opinion on the post-union closed shop agreement between the city council and the National Association of Teachers in Further and Higher Education.

Although he failed to persuade his academic board to seek a ballot in the polytechnic, he said this week: "I would support any move anyone feels like making." Dr Nutgens is a Natfhe member.

Under the agreement all new recruits at the polytechnic and the city's colleges must either be Natfhe members or agree to join.

Fresh impetus to the row has been given by complaints that one of the polytechnic's two Natfhe branches was unable to ballot its members through lack of time.

National and Local Government Officers' Association is still "blocking" the work of five unfilled administrative posts at Leeds.

## Polys fear Land Bill clauses

Polytechnic directors are expressing concern at Government plans which could make it considerably harder to raise funds for building projects from next year.

The Local Government Planning and Land Bill (No. 10) in committee stage in the House of Lords, contains clauses which will mean polytechnics will have to negotiate with local authorities to finance capital expenditure.

At present polytechnics can apply for special "start-up" allocations direct from central funds for projects costing more than £10,000, with local or national significance.

If the new clauses are agreed, all future capital expenditure will go through local authorities. The amount, which will not cover more than £5,000, will be based on estimates of committed and planned expenditure.

## Policies unveiled for mid-career refresher courses

by Charlotte Barry

High Government policies on mid-career refresher courses are higher, and further education institutions were unveiled this week by the Department of Education and Science.

A new "discussion document" Continuing Education: Post-20 Guidance, Vocational Provision for Adults in Employment, proposed policies in various areas, including: "The Government is committed to the provision of continuing education for all who wish to take it."

Methods and course planning approaches. "The Government is committed to the provision of continuing education for all who wish to take it."

It will also seek cooperation from research and training bodies in assessing the extent and nature of demand for post-graduate work and ask the Advisory Committee on Higher Education to consider the need for post-graduate work.

in-service training of lecturers on these courses. The department intends to employ to meet the full costs in the first year, but will emphasize the importance of the value of post-graduate work through the Confederation of British Industry and the Trades Union Congress.

The 15-page document, which is a report produced by the Model 20 Research Study Group set up in 1978 in the aftermath of the Labour Government's discussion paper Higher Education: The 1990s, emphasizes the importance of mid-career refresher courses in the development of the

and technological change. "We must develop the qualifications and skills needed in the country's workforce if managers and employees at all levels are to be able to meet successfully the complex challenges facing them and to promote economic growth," it says, acknowledging that much is already being done.

"There are many bodies and individuals engaged in identifying needs and in making provision. As post-graduate work grows, it is important that it should become a part of the view of demographic trends, not an isolated even central part of the provision for the development of the workforce."

## Part-time pay dispute settled

by Olga Wojtas

Scottish Correspondent

Glasgow university court will not consider an application for settlement on the grounds of health from the head of its psychology department, convicted in 1978 of throwing a bottle at a colleague.

In view of the application, the professor, Derek Corcoran, the only one who has been found guilty of such an offence, was asked to leave the university.

The professor's case was dismissed on the grounds of health, but he was asked to leave the university.

The professor has lost his appeal against an 18 month suspension, after admitting a charge of attempted assault on a colleague. He was also charged with throwing a bottle at a colleague.

At the appeal, the professor's counsel said that the professor was suffering from a mental illness, and that he was not fit to hold office.

The professor was found guilty of attempted assault on a colleague, and was suspended for 18 months.

The university court has rejected the professor's application for settlement on the grounds of health.

## A shaggy dog story

It will be anything but a dog's life for a shaggy dog named Pug, a white mongrel belonging to Alexander, principal Sir Kenneth MacKenzie, who is in the process of moving into the principal's new residence.

MacKenzie is a shaggy dog, and his dog is a shaggy dog. The dog is a shaggy dog, and the dog is a shaggy dog.

## Israeli claims confirmed

by Olga Wojtas

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Inquiries by The THES have confirmed allegations that Exeter University had political reasons for barring six Israeli academics from a recent symposium on Saudi Arabia.

The vice-chancellor, Dr Harry Key, had earlier denied the charges, saying the decision to bar the academics was linked with the financial aid the university receives from Arab countries.

The documents do not, however, bear out suggestions that the decision to bar the academics was linked with the financial aid the university receives from Arab countries.

In an angry exchange of letters with Lord James, president of the Zionist Federation of Great Britain, Dr Key denied that there had been any political reasons for excluding the Israelis.

But documents obtained by The THES show that fear of antagonising the Arab participants was the real reason for the exclusion of the Israelis.

A letter last month from Lord James had expressed "deep concern" about the exclusion of the Israelis.

In his reply, Dr Key said that three times as many participants wanted to attend the symposium as could be accommodated.

## NUS threatens to call in ombudsman on funds

The National Union of Students has threatened to call in the Parliamentary Ombudsman if administrative unions fail to negotiate for funds within their own institution, competing with all the other financial claims on a college or university budget allocation.

Mr David Aaronovitch, NUS president, said: "We mean to make the point that the new rules of the game are not being handled. The DES seems to want to get rid of the matter as quickly as possible by showing all the real problems on other grounds, including NUS."

## Student enrolments increase as financial growth is stunted

by Ngalo Crequer and Paul Flather

Student numbers in higher education are continuing to grow despite the Government's policy of "level funding" and fears that new spending cuts are being considered by the Cabinet. Universities and polytechnics which have expanded first-year recruitment this year will be forced to teach more students with less money.

Provisional figures released by the Committee of Vice-Chancellors and Principals this week report that there will be 78,939 home undergraduates accepted this year compared with 76,631 in 1979. Overseas undergraduate numbers are expected to remain almost exactly the same as last year—5,756 compared with 5,767.

Polytechnics, too, expect a big increase in enrolments. The Committee of Directors of Polytechnics says that home undergraduate numbers will increase this year by about 5 per cent.

The growth in student numbers is entirely out of step with the Government's plans for higher education spending. Vice-chancellors fear that by 1982, more students will be enrolling than the universities can handle, and that the quality of teaching will be depressed.

Similar fears were expressed last year when the University Grants Committee advised universities to reduce their first-year intakes by 8 per cent in order to keep overall numbers constant. The advice was subsequently withdrawn, but the policy of "level funding" has remained.

Many universities say they have been unable to resist the pressures of an increasing number of well-qualified candidates wanting places. Lancaster University reports the biggest undergraduate admission in its history, with 27 out of 38 departments exceeding their agreed quotas.

At the University of Manchester, the history department is in line with Government forecasts on student numbers published two years ago, but last year's Expenditure White Paper departed from tradition and made no forecast of student numbers. In the DES, long-range planning for numbers appears to have stopped because of the uncertainties about Cabinet spending plans.

Now that many institutions appear to have expanded intakes despite the official policy of "level funding", the roll-on effect on later years is bound to result in a substantial drop in spending per student.

## EEC duty could hit scientists

by Robin McKie

Science Correspondent

University science departments are facing a serious new threat, this time over the interpretation of EEC import duty regulations.

The problem affects scientists wishing to use commercial scientific instruments for basic research. In cases where they were previously granted exemption from import duty on overseas-built machines, they are now finding they can no longer recoup those taxes—which can add up to 25 per cent to costs.

The increase is being taken very seriously by universities as their financial ability to replace outdated machines is already strained. Last week, the Heads of Chemistry Departments conference in London agreed to contact Common Market colleagues to investigate interpretation of EEC guidelines in other countries.

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British academics believe the Department of Trade officials are being over-zealous in implementing the Common Market regulations. In previous cases where a department needed a new machine that could not be supplied by manufacturers in Common Market countries, import duty was formally waived if the instrument was to be used in scientific research or the advancement of knowledge.

New EEC regulations, changing this state of affairs are now being rigorously imposed by Department of Trade officials. These state that instruments built for commercial purposes, but used for basic scientific work, will no longer be exempt.

For instance, one university that wished to purchase a Canadian high-speed pulse generator for fundamental research in low density plasmas was told it could not receive duty exemption as the machine "had not been developed primarily for scientific research."

In a paper which was presented to chemistry heads conference, Mr C. I. Sanderson of Bath University said these decisions had "caused amazement among scientific colleagues" and had resulted in protests being made to the Department of Trade.

He proposed a campaign that would include putting political pressure on high levels of the Department of Trade, sponsoring parliamentary questions, approaching local members of the European Parliament, and ultimately applying for a judicial review to the Queen's Bench Division of the High Court.

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The students are pressing for guidelines to safeguard the independence of student unions which are being threatened by the implementation of the new rules, before the new rules are implemented and have threatened to call in the ombudsman if Department of Education officials do not clarify the position.

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## Schools' industry debate ignores 18-plus power

In fact, much of the debate was

In fact, much of the debate was reminiscent of the Labour Government's Great Debate, with industrialists and head teachers sparring over each other's attitudes to education. Teacher training naturally loomed large in the proceedings, despite the almost total absence of those involved in the area. A paper produced by the Department of Education and Science hinted at the

possibility of higher grants to attract more students to teaching in subjects suffering manpower shortages. Although applications to the postgraduate courses were up, those on RED courses remained depressed, the paper said, adding: "DES is examining ways of making training for shortage subjects more attractive."

The suggestion, struck a chord with councillor D. Lightbown, chairman of the Staffordshire education authority, who said there was too much choice in higher education and this had led to the shortages. He would favour variable grants, possibly combined with a move towards loans for subjects in other areas.

warwickshire, Mr M. L. Ridger, however, put the blame for this and other ills on examinations and, in some cases, on the universities. Examinations were dominating and distorting the school curriculum, he said, making it impossible to carry out industrialists' advice. In craft, design and technology, for example, the universities were a direct cause of the shortage of teachers because of their refusal to accept A levels in the subject.

## London school warns against part-time study

**is the key to  
Lord Flowers**

academic future. Already university teachers are an aging population, an immobile population, unwilling to take risks with their jobs." He said that without the young, national research potential was emasculated and, lacked leadership for the future.

Further, the breakdown of the support system of research funding meant that the government was not sufficient to cover all the overheads associated with research.

"When allowances is made for increased salaries, for the rising cost of scientific equipment, for the maintenance of premises, what a

# Survey shows greater chance of employment for new teachers

## ENDING AND CANCELLATION OF REVENUE COURSES

## Colleges saved by 'self-financing' deals

Christopher Frice, MP, chairman of  
s, Mr Peter Newsam, Mr J. B.  
and Professor Robert Berdahl.  
in the Waterloo Room at the Royal  
ember 5, 1980, starting at 9.30 and  
l be £30.00. Applications should be  
y  
National Office  
London Polytechnic  
Road  
RAS

## Poly directors step up fight against ratepayer control

Such courses must be fully responsive to change in demands, and Birkbeck was well placed to adapt to circumstances. "... machinery...

## Thames governors vote for transfer

Governors of Thames Polytechnic have voted overwhelmingly to transfer the school of architecture from the main Woolwich site to the Dartford outpost.

A two-hour debate culminated in a vote for the move with five against and two abstentions.

"The court is confident that with the support of the Inner London Education Authority the means can be found to ensure that the school will be in a condition as serviceable as no less favourable than it currently enjoys—and will have access to residential and social facilities in many respects superior to those at Woolwich," a polytechnic spokesman said.

The object of the move—about three years after the school were transferred from Hammersmith at a cost of £250,000—is to create a better use of the underused Dartford site.

The governors expressed their regret at a dislocation which they enforced moves would cause for the school's students and said they were acutely conscious of the inconvenience for part-time professional students.

# THE FUNDING AND ORGANISATION OF HIGHER EDUCATION COURSES

A one-day conference organised by the North East London Polytechnic and the University of Warwick in association with The Times Higher Education Supplement to consider the forthcoming report of the House of Commons Select Committee on Education Science and the Arts.

Speakers will include Mr Christopher Price, MP, chairman of the committee, Lord Robbins, Peter Newman, Mr J. B. Butterworth, Dr C. S. Bryson, and Professor Robert Bernal.

The conference will be held in the Waterloo Room at the Royal Festival Hall on Friday, December 5, 1980, starting at 9.30 and finishing at 4.45. The cost will be £30.00. Applications should be made to:

*The Secretary  
NELP International Office  
North East London Polytechnic  
Longbridge Road  
Dagenham  
Essex RM9 2AS*

POLYTECHNIC		RAI/PATERS	
		CONTRIBUTION TO	
		1979/80 BUDGET (%)	
North Staffs (99/10)		3.8	
Birmingham		0.7	
Preston (Lancs)		0.7	
Leeds		4.4	
Leeds/Leeds (Glos)		4.4	
Bristol (Avon)		4.4	
Teesside		3.8	
Trant (North)		3.8	
Southbank			
Canter London			
North London	(ILEA)		
Oliv			
Thames		3.1	
Wales (Mid-Glamorgan)		2.7	
Huddersfield (Ripides)		2.7	
Phymoth (Dawn)		2.7	
Brighton (East Sussex)		2.7	
Farnhampton (Hants)		2.3	
Liverpool		2.3	
Manchester		2.3	
Hatfield (Herts)		2.3	
Sheffield		2.0	
Wolverhampton		2.0	
Middlesex		1.9	
Cowesbury		1.9	
Newcastle		1.9	
Sunderland		1.9	
Cardiff		1.9	
NEL		0.0	
Queens		0.0	







## Overseas News

## 'Learning factory' sets up crisis centre

from James Hutchinson

**BONN**  
The University of Bochum, conceived in the early 1960s as a model campus, has acquired the reputation of being West Germany's most important 'learning factory'. Literally, a learning factory. Its students long since set up a society to help people with suicidal tendencies, and recently university funds were provided to establish a "crisis intervention centre".

Some 55 suicides were recorded among Bochum's students between 1969 and 1979, and 62 deaths from unknown causes were also registered. The crisis centre is designed to help students solve a variety of personal problems, and in particular assist newcomers.

The foundation of the Ruhr university at Bochum was an important event in German academic life. A concentration of professors and students in the industrial area was a novelty. Whether it had been determined that the region should remain exclusively a place for hard industrial labour, and decided that neither universities nor army barracks should be built there.

But the architects of the Ruhr university appeared to forget that the campus was to be used by people, and should ideally be a

centre of human contact. The university, which now has nearly 30,000 students, consists of a labyrinth of ugly concrete blocks, and many of these still have difficulty in finding their way about.

Indeed the story is told that the principal architect was to receive an award for his design, but was unable to find the hall where the ceremony was taking place. Instead of walking across the campus (and running the risk of getting lost) many students prefer to drive to their destinations along the perimeter road. The buildings are identified by what sounds like a secret code. GA-PO 04/611, for instance, stands for Institute of Arts, block A, area east, storey 04, room 611.

Nearly two thirds of the students live at home in various parts of the Ruhr and commute to the university which has parking spaces for 8,000 cars. The students' typical day is similar to that of a white-collar worker: drive from home, find a parking place, up in the lift, lecture, down in the lift and home again. Most students arrange their courses so that they need not travel to Bochum more than two or three days a week.

But the real problems are faced by those 5,000 students who live in the cheerless hostels on the campus.

## Professor hits out at graduate 'poaching'

from Geoff Maslen

**MELBOURNE**  
Leading British electronic firms were "picking off" Australia's top engineering graduates and contributing to a critical shortage of engineers.

This would reduce Australia's participation in its own multi-million dollar energy projects, according to the President of the Institution of Australian Engineers, Professor Lance Enderby.

"I get rather upset when top British electronic industries just come along and pick off our top graduates. They know they'll create the future for their firms," Professor Enderby told a conference on electronic supply 1980 in Sydney.

Professor Enderby said Australia was facing a 35 per cent decline in the number of engineers graduating from universities and colleges over the next three years. He would undermine Australia's ability to equal to the challenges offered by overseas companies in the development of the country's resource projects. These projects were likely to start in the energy intensive industries of electricity, supply, mining, aluminium and petrochemicals, and could be worth up to \$500,000 in the next 10 years.

"But are we equal to these tasks? We are short of skills right now and we are certainly not producing the engineers we need," Professor Enderby said. He claimed that too many Australian teachers were anti-technology and that few had been adequately trained in mathematics and science.

The result was that students were not studying mathematics, physics or chemistry. "They're all doing sociology and nonsense and we've got to catch that. It's not to see all this emphasis on finger painting and what-have-you," Professor Enderby said.

Professor Enderby, an outspoken campaigner from Monash University, said that 1980 engineers' students would be 10 per cent down on 1979. By 1983 only 1,500 would graduate, a decrease of 35 per cent. "We're in the position where these aluminium projects are starting, where there's to be a great expansion in electricity supplies and where the 2,000 engineering workers' conference will fall by more than 100,000 in three years."

This would seriously reduce the extent to which Australia and Australian industry would be able to participate in projects such as the gas pipeline from the Middle East, caused by the spectre of British firms was exacerbating the situation.

## Right-wing victory could split union

from Benny Morris

**JERUSALEM**  
Israel's National Union of Students (NUS) is facing a major split, right-wing as its chairman.

Tzvi Hanegbi, son of ultra-right-wing Knesset member Gita Cohen and last year's chairman of the Hebrew University Students' Union, was elected NUS chairman by the block-voting delegations from Jerusalem University, Tel Aviv University and Tel Aviv University. This was reinforced by some students from Bar-Ilan University, the Hebrew University and Tel Aviv University whose current student union leaders are affiliated to the country's ruling right-wing Likud Party. Together they account for 52 per cent of some 30,000 of Israel's students and hence dominate the NUS council. These leaders, such as Hebrew University student union chairman Yehoshua Katz, identify with the ultra-nationalist wing of the Likud or with its splinter group, the U Thiyah Party.

Hanegbi's election was opposed by the representatives of the unions of Beersheba's Ben Gurion University, Haifa University, the Haifa Technion and the Weizmann Institute. The majority of the Ben Gurion University representatives.

Hanegbi, like his mother, is affiliated to the New Thiyah Party, a breakaway faction from Prime Minister Menachem Begin's Likud. Hanegbi last year faced internal disciplinary hearings at the Hebrew University and was expelled from the student union.

He was acquitted because of "abandoning to the university court" conflicting testimony, but still faced disciplinary proceedings over the incident.

The student unions of the Technion, Haifa University and the Weizmann Institute announced that they are considering the legal and financial consequences of possible withdrawal from the NUS. They charged that Hanegbi was to curb the NUS into a "political body" and that he has already started working on the campuses with an eye to the general elections of 1981.

The opposition unions are considering establishing an alternative national union which will look to students' interests and affairs and leave politics to the politicians, said Shalom Neher, a member of the Weizmann Institute's student union council.

## \$20m to be spent under the sea

from Guy Neave

**PARIS**  
A new boost is to be given to France's ocean research programme. Compared with 1980, the budget for the coming year is to be increased by 30 per cent to £20.8m.

The increase is to meet three new priorities in the area of ocean research. The first will be the construction of a mini reconnaissance submarine capable of reaching depths of up to 20,000 feet. Additional resources are to be devoted to research into marine pollution. A second priority will be exploration of the sea-bed to locate new sources of oil and a third priority will be an exploration

for metal nodules in the Pacific. Though ambitious, these programmes are running into difficulties as a result of the decision earlier this year to split responsibility for ocean research between different ministries. Fishing and aquaculture comes under the aegis of the ministry of transport and programmes involving mineral and energy resources fall under the ministry of industry. The ministry of higher education is to finance those areas not covered by the other two.



Striking Polish workers demanded the "free activity of society"

## 'University' comes out into the open

Poland's unofficial "flying university" (the Society for Academic Courses) has re-emerged from the shadows. After a year in which police harassment has reduced its activity to closed secret seminars, the SAC is openly recruiting for 16 lecture courses to be given in Warsaw, Krakow, Wroclaw and Poznan.

Dr Andrzej Drazewski, head of the SAC syllabus committee said last week: "The present atmosphere in Poland is a call to open and public activity." The need for the society's type of lectures, he said, is ever increasing. The new "self-governing" students' movement and the federation of independent trade unions are, he said, "new friends of the SAC". There is a growing feeling of unity among the cultural and educational community.

The SAC was founded early in 1977 to counter the official monopoly of teaching which, in the opinion of the organizers, was producing distortions (whether by commission or omission) in the presentation of history, sociology and literature. The SAC was openly backed by almost 100 leading scholars, and according to its "dean" Dr Jan Klejanowski, it had to ask many younger academics to refrain from open support which might ruin their careers. Those who signed the SAC documents were mostly retired or approaching retirement, or had already incurred the displeasure of the authorities.

Originally the SAC gave public lectures in structured courses, held in private homes, or occasionally, on church premises. For two years the authorities mounted an increasing campaign against the movement, banning, by swiftness, those participants who allegedly contravened safety regulations by allowing up to 100 people into their apartments and ending with the 48-hour detention of intending lecturers and the breaking up of lectures by organized gangs of hoodlums.

Since October 1979, except for one attempt at an inaugural lecture, the activities of the SAC have been driven entirely underground. The announcement that the SAC would resume open activity came only a few days after the Soviet Warsaw University issued a demand for academic freedom and democratic reforms. Convinced that the Gdansk Accords which concluded the summer strikes must be fully implemented if social justice is to be realized and the economic crisis overcome, the senate called for "renewal and stabilization" in the political sphere and the opening of the "free activity of society".

is a particularly large problem in the field of oceanographic cartography which relies heavily on scale equipment. It has also prevented the emergence of a comprehensive research strategy.

Earlier this year when the SAC was first outlined hopes were expressed that the national ocean development (CENOD) act as a major liaison body. But this has not happened. The ministry of industry for example has refused to fund the exploration programme in the reserves leaving this to the ministry of higher education. The ministry of transport has so far been unwilling to unveil its future programmes.

No inquiries are turned down and the service is provided free of charge. Scientists have even been sent the Weeping Madonna, a figure alleged to produce tears, and parts of the sunken galleon, Mary Rose, for investigation.

It is a role that brought the SAC to the fore during the major 1976 drought in England. "We were inundated by hundreds and hundreds of samples of roots sent in by solicitors, surveyors and house owners who had found them under property affected by subsidence or cracking," said Professor Keith Jones, keeper of the laboratory.

The problem stemmed from nearby trees. Affected by the

In his continuing series on 'hidden research', Robin McKie visits Kew Gardens

## The science lab with branches everywhere

Plant research involves a dusty image of scientists pouring over samples of old dead leaves and dried flowers. In fact, as scientists at Kew Gardens quickly point out, it can lead you down some rather unexpected paths.

Take work being carried out at their Jodrell laboratory which specializes in plant physiology, biochemistry and anatomy. One of its services involves the identification of fragments taken from any given material. These can include pieces of driftwood, furniture, sawdust, drugs and even charcoal, which can be typed from microscopic detail of the original wood.

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The problem stemmed from nearby trees. Affected by the

drought, they sought water through the spreading of their roots. In clay soil, this caused shrinkage round these roots and buildings above often suffered cracking as a result. Identifying the types of trees responsible then became a pre-occupation for solicitors and surveyors anxious to trace the exact tree causing the problem.

"In the end we were forced to start charging for the service and people had to pay £5 a root for the privilege," added Professor Jones. Now they pass on such samples to a private consultant for identification.

However, the plant researchers have not been resting on their laurels. With support from the British Insurance Association, they have carried out further research into root spreading, the distances involved, its effects on buildings and those trees which are the worst culprits.

The results will shortly appear in a handbook on tree-planting to be published by Construction Press, and which is aimed at helping landscape planners, engineers, architects, and builders with problems that might arise from indiscriminate planting of trees.

"We are proud of our tree-lined streets, yet could find them cleared if found to cause damage to housing," said Professor Jones.

This would happen if the wrong sort were planted in city areas with clay sub-soil.

In fact, willow turns out to be the worst offender, although Professor Jones added that it would be wrong to be too concerned about this as other factors were also involved in subsidence and foundation cracking.

The laboratory's work provides a clear illustration of the importance of the research at Kew, which carries on a tradition dating back to 1759 when a small nine-acre botanic garden was established in Kew House Estate. Under the succeeding reign of George III, the neighbouring Richmond House estate was merged with that of Kew House and the work of botanic garden was established. Later in 1841, the garden was acquired by the nation on the recommendation of a committee appointed by the Treasury.

Over the years, additions to the gardens include the Herbarium, the museum of economic botany, and later the rich-soiled estates of Wakehurst Place in Sussex. The result is one of the most beautiful gardens in Britain, a unique living collection of botanical material, and a major source for basic research by scientists.

One of its major facilities is the herbarium, established in 1852, and

which is claimed to house one of the largest collections of its kind in the world. It consists of about five million dried plants, 35,000 glass jars of flowers and fruits. In liquid preservatives, and a major collection of fruits and seeds.

Its work is divided between the curation and the maintenance of the collection; the routine naming of specimens and research into new species. It all concentrates on one particular area—taxonomy, the precise identification and classification of plants.

"It is an art as well as a science," said Mr Peter Green, deputy director of Kew and keeper of the herbarium. "Some people have a gift for it and can recognize similarities and differences between species with ease. They are simply born taxonomists."

Their work is of crucial importance in providing a baseline of information for other researchers. There is no point in investigating the properties of a plant if the samples being researched consist of more than one species or if they can be confused with other similar types.

Increasingly, Kew is also becoming a focus in the conservation of endangered species of plants, of which about 2,500 are now threatened, particularly those from tropical rain forests where commercial development is causing major destructions of large sections of land.

"The idea is that by growing rare specimens here, they can then be returned to the wild at a more suitable time. However, it is a very poor second-best to properly preserving the wild areas of our planet, because you cannot reproduce the world's tropics inside a few glass-houses," added Mr Green.

Yet work is not limited to looking after the gardens and organizing research. The gardens have an important educational role, particularly running the Kew diploma, a three-year course, at present attended by 60 students, that concentrates on the managerial aspects of amenity horticulture.

"We have several degree holders on the course and have had 100 in the past, although they need only get A levels to get in," added Mr Green. "A Kew diploma is highly regarded throughout the world and in many ways is as good as a bachelor degree in horticulture, and in many ways goes beyond it."

Other educational links include ties with various universities, such as Reading and University College,

The pagoda at Kew.

London, and the establishment of visiting professors, such as Professor Jones. His laboratory also receives Science Research Council grants and the Agricultural Research Council also assisted in setting up the biochemistry laboratory at Jodrell.

Its work has concentrated on chemicals found to be packed into seeds and which were once thought to be useless as they seemed not to have any nutritional function. Now research on various tropical plants suggests that these chemicals may be vital in protecting seeds from various insects, and could reveal them as a source of new antibiotics, anti-tumour agents and drugs for treating ailments such as Parkinson's disease.

The course of these developments will be shaped by research carried out at centres such as the Jodrell laboratory. It could prove crucial to the future of agriculture, and, as stated, is certainly far from the image of the old dead-leaves and dried flowers.

The palm house in the centre of the gardens.

Ngaio Crequer reports on the work of a committee with a daunting task

## Why London University finds itself in Dyer straits

In the last six months Sir Peter Swinerton-Dyer has been sifting through countless documents telling him how good the schools of the University of London are.

He has read of departments that are unique, of courses that meet essential national needs and of buy-out student demand, of consistently high quality.

Universities are generally, he believes, but if they are ever under attack in the future they might do well to present some of the evidence they have marshalled together to present to Sir Peter.

However, his job is the critical one. The documents are the submissions presented to him by the schools in his role of the committee of academic organization at London University.

Although heads of schools, in their personal contributions to the inquiry, may have been more pertinent and certainly more punchy, this more public school-wide submissions have pointed out to hostages or sacrifices.

Sir Peter and his eight-member committee were given the task of reviewing every aspect of non-medical education at the University. They are charged with finding ways of maintaining and developing the university's teaching and research and attempting at the same time to expand jobs.

The committee was set up at the beginning of the year because of the need to plan for a profound drop in the birth rate, with its implications for student demand. In the decade following 1983-84, on top of this was the belief that the next five years to 1990 would be the best time to change the university's teaching and research, and the decision to merge the University of London with the University of East Anglia and the University of York.

Sir Peter has said that he is not then, concerned with the immediate future of the university over the next 10 to 15 years and he believes his committee should make recommendations over such a period.

He has, though, it seems, ruled out one school of achieving large savings, that of making academic staff compulsorily redundant. He has written to a London branch of the Association of University Teachers to say that the loss of morale, the selection problems, legal difficulties and the cost would provide insurmountable obstacles to such a course.

The alternative, one presumes, lies in merger, either of whole colleges or of departments within the University as a whole. The colleges, with few exceptions, say they already collaborate where it has been found to make good academic sense, and that merger per se is not necessarily cost-effective.

University College said in its submission that it has no intention of moving beyond the very valuable and fruitful co-operation within the university that already exists towards some possibly illusory objective of achieving questionable savings through mergers, exchanges or other so-called "rationalization".

It has no "tail" of weak departments that would benefit from being absorbed into departments at other schools. It has only strong departments and exceptionally strong departments. Nor does it have the room to accommodate departments on offer from elsewhere.

This is not to say that University College is against voluntary collaboration with other schools where desirable, and it gives examples: UCL and Westfield combine in the teaching of History of Art, and UCL and King's collaborate in Modern Iberian and Latin American Studies.

In both cases UCL says that to go further and physically merge the staff would produce no savings but damage other joint courses in the respective institutions.

Collaboration is helpful and it is being carried out, but merger would be a disaster. "Longstanding members of the UCL staff can remember no period when the University of London was abstaining from active discussion of the potential gains to be achieved by mergers and other 'rationalization' exercises. Almost every faculty has been studied many times and the advantages and disadvantages exhaustively probed."

And the one exception, says UCL, is the case of the School of Slavonic and East European Studies, which is being pursued anyway outside the present inquiry.

The King's submission, though, is curious in the way it offers up subject which are "not vital" to amalgamate them back by stressing their

distinction, echoes the weariness of London with rationalization.

It says that much time and effort has been expended at the university in the past on the topic of rationalization, "so far without any noticeable success". It doubts whether amalgamation of two or more departments would lead to significant savings.

Westfield regrets that the inquiry does not seem to realize the extent of existing inter-collegiate activity. It supports the "collaboration—yes, and amalgamation—no" line and says that because of interdependence of internal courses mergers would be difficult and damaging.

The LSE has told the committee that there are the strongest possible academic arguments against the shedding of subjects and no financial ones for their curtailment although there will always be organic change.

The Institute of Education refers to the suggestion that it has been made several times in the past that King's work in education could be assimilated by them. But there would be little academic advantage, it says, and only small financial savings. The two were completely amalgamated in 1964. It makes the same point about amalgamating subjects at Chelsea College and the Institute.

But not all the colleges have given an outright "no" to amalga-

nation, although none examines it in very great detail. Lord Flowers of Imperial College, now on the other side of an inquiry, calls for radical measures and greater devotion.

The Imperial proposals are as controversial as any the committee is likely to come up with. It sees different roles for larger and smaller schools. "The larger and more viable" are ready to benefit from greater autonomy. "Some of the smaller and more vulnerable" could concentrate resources on limited objectives.

Two of London's smaller schools, Chelsea and Queen Elizabeth College have said that departments from different institutions could be merged, in some cases.

Chelsea says that there is a need to maximize one of the greatest advantages of the federal system, which is the scope for sharing expertise, equipment and other resources. But any reorganization must not restrict the freedom of diversity enjoyed by the colleges, by imposing extra layers of control.

According to QEC reducing the number of departments in a given discipline would be a disaster. It would give coherence and strength, it says that the desire by each college to teach a wide range of subjects depresses standards and increases costs.

The Swinerton-Dyer committee has two choices. It can respond in kind and think about round the edges, just to justify its existence. But this would clearly not produce any large financial savings.

Or it could propose some large-scale amalgamations of departments, and even schools that would lead deep into the heart of London University. But proposals of that nature are a long way removed from implementation.

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# The post-E epoch: courses that refresh parts worth reaching

Last week the Government published a new discussion paper on continuing education, calling on universities and colleges to mount more mid-career courses for older men and women. Here Charlotte Barry examines the new discussion document and Peter David (below) reports on the unpublished civil service study on "Model E", which preceded it.

The Government's new policies to encourage more mid-career refreshers courses in universities and colleges are intended to be a quick-fire method of advancing better economic growth and a more relevant workforce.

They are only a small part of equally relevant and much wider developments being sought by workers in the whole field of adult and continuing education.

The new discussion paper, *Continuing Education: Post-Experience Education*, is not meant to be a broad philosophical document. It is attempting to promote a practical course of action which can be implemented rapidly at the minimum public expense.

"Rapid social and technological changes underline the importance of continuing education to the full development of the individual, to the well-being of society in which he lives, and to the strength of the economy which underpins it," it says.

"We must develop the qualifications and skills needed in the country's workforce if managers and employees at all levels are to be able to meet successfully the complex challenges facing them and to promote economic growth."

The paper's main concern is to remove the financial and administrative obstacles preventing universities and polytechnics from mounting short, part-time courses. However, it concedes that much work is already being done.

At the moment institutions meet the need for post-experience courses through three main broad types of provision. These are longer courses leading to a qualification;

short courses, conferences and seminars on particular topics; and tailor-made courses geared to a specific sector, usually at the request of employers.

The statistics reflect a considerable development in this area over the past decade. Students on the short and tailor-made courses cannot be clearly identified, but many of the 70,000 enrolled on short courses in 1979-80 were estimated to have fallen into this category. So are the 57,000 doctors and dentists enrolled on short postgraduate courses in universities in 1978/79.

Most of the 230,000 enrolments on courses run by extra-mural departments in 1978/79 (197,000 in 1972/73) were engaged in updating work, but some would be on refresher courses designed for groups such as teachers, magistrates, social and health workers.

A more detailed picture can be seen in the universities in 1978/79. About 367,000 students were enrolled in 15,552 short, post-experience and vocational courses. Of these, 2,552 postgraduate medical courses and 97 per cent of the 2,569 non-medical courses mounted in university departments were also vocational.

More than 1,100 (7 per cent) of all university short courses were attended by students from United Kingdom industry or commerce, and only 638 courses led to an award. More than 1,100 (14 per cent) of 8,337 extra-mural courses were vocational.

Nearly 8,000 (51 per cent) of all courses involved no more than nine meetings or seven days' attendance. Nearly 3,000 (18 per cent) were full-time for short periods, about two-thirds of the courses did not



require consecutive attendance, and those that did were mostly for periods of seven days or less.

The Open University is expected to have 39,000 students in 1981 on courses outside the first degree programme made up of 7,000 associate students and those on specially designed refresher courses. This will include 14,000 following other short courses in the post-experience programme.

In encouraging more institutions to mount this kind of short, part-time course, the Department of Education and Science intends employers to meet the full costs involved. Changes in financial and administration procedures will provide further incentives.

The document suggests that where a course is entirely self-financing the departments concerned could keep the whole fee income to pay for it and future development. But this would only be practicable where there is clear demand for a course, teaching staff

of Government constraints on the buildings should not be seen as a deterrent. It suggests intensifying the use of existing accommodation by holding courses outside normal working hours or even at the workplace. It also suggests creating extra accommodation at the client's expense.

The courses themselves should be flexible and designed to suit lengthy periods of release from work. The document says, "Many courses could be offered as modular courses, either by developing new ones or tapping into full courses. Even master degrees could be provided through a succession of coordinated short courses."

They should also take account of previous in-house training and work experience.

"Institutions should not ignore the extent to which experience gained in employment might be recognised as equivalent qualification for entry to courses which would normally require the acquisition of more formal qualifications without any additional foundation or preparatory course," the paper states.

The DES intends to ask the Advisory Committee on the Supply and Education of Teachers to set up proposals for in-service training of lecturers on refresher courses. It also recognizes the need to keep abreast of developments in industry and recommends a close economic and academic staff to that sector.

"Willingness to acquire necessary expertise will depend on a continuing awareness among staff that post-experience work is not a sideline but an integral and important part of their work," the document says.

In order to help collaborate between institutions and employers, the paper also promotes machinery to co-ordinate local, regional and national demand for short courses and a national information service for clients.

Copies of the document are being distributed to local education authorities, educational institutions, research councils, professional organizations, industrial training boards and validating and accrediting boards.

Comments on the proposals should be sent before the end of the year to Mr. W. A. Smith, Department of Education and Science, Room 5/25, Elizabeth House, York Road, London SE1 7PH.

**Continuing education: post-experience vocational training for those in employment is available from the publications department, Department of Education and Science, Honeyport Lane, Cannon Park, Stomors, Middlesex HA 1AZ.**

## How a polytechnic's image crumbled

Paul Flather on the background to the strained relationship between Huddersfield Polytechnic and Kirklees Metropolitan Council

Huddersfield is a tough Yorkshire town, for centuries a major centre of the textile industry. Textile production is now in decline, but the town retains a sense of pride in its home-grown philosophy of self-help and independence. It is even described as the "town that bought itself", a reference to the old borough council's purchase of 430 acres including the town centre, from a landowner in 1920.

In Huddersfield the guidelines for the government of polytechnics, those far-reaching but somewhat vague statements now appear to be reading their sternest test yet.

Certainly the public row between Huddersfield Polytechnic and Kirklees Metropolitan Council, a row which at times has bordered almost on warfare, is being closely scrutinized by all those connected with polytechnic life.

Huddersfield Polytechnic was created in 1970 from the former college of technology and the Ouseley College of Education; four years later the Huddersfield College of Education was added. Mr. Kenneth Durrands, then working in the engineering industry, was appointed rector, and the polytechnic, under the control of the old town borough council, set about promoting its image as an institution of national standing.

Expansion was rapid, culminating in 1977 with the opening of a magnificent central services building. The building has quickly become a landmark, as much so as the council's civic leaflet, the "Polytechnic now has some 3,300 full-time and 2,500 part-time students."

But by the time the new building was opened, councillors were beginning to grow uneasy that the polytechnic seemed to be running its affairs under a different set of financial rules to those used by local authority concerns, and became shorter, so

Kirklees had already set in motion a painstaking audit at the polytechnic, carried out by chief financial officer, Mr. Peter Sharman, when the council suddenly found itself facing an extra bill because of the ill-fated Shiraz project.

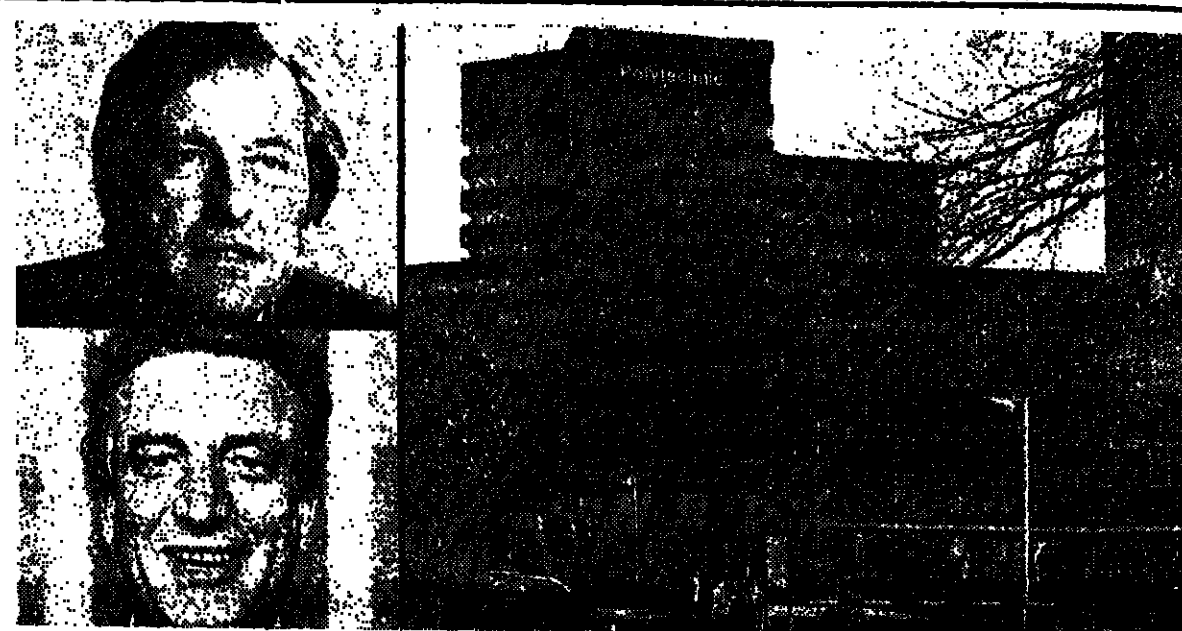
This involved setting up a special course on behalf of the former Iranian government to train engineers. Although it was understood that the Iranians would pay full-cost fees, Kirklees found itself underwriting costs of nearly £200,000 because the course was not "pooleable" and eventually footing a bill of £47,000 plus the estimated loss on the course of £78,000.

Councillors say now that they made strenuous efforts to disavow the rector from going ahead with the project. The governing council said the project, although unsuccessful, was not done with any improper motives.

The fall-out from the course turned the question of "polytechnic spending" into a local political issue. The idea that ratepayers were paying for the education of Iranians won the polytechnic few friends and the affair came to light soon after the Iranian revolution.

When the audit report was leaked after 18 months of preparation, Huddersfield Examiner ran a two-page report. The council set up a five-man working party, including the leaders of all three political parties, and called for blood because of the allegations of financial maladministration by academic staff detailed in the audit. The governing council immediately passed a vote of complete confidence in the rector and his staff, questioned the professional standing of the report, and denied or played down the bulk of the allegations.

A second audit report, apparently confirming and extending the allegations of maladministration is on the desk of council officers. But since last January the positions of Kirklees and the polytechnic have



Mr Durrands (above) and Mr Mernagh have been closely concerned in the polytechnic's running.

not changed much.

The effect of the audit was to polarize relations which had been growing sour anyway and to mask perhaps the more serious crisis of underfunding caused largely by the arbitrary nature of the capping of the AFE pool last year. This crisis almost led the Council for National Academic Awards to suspend enrolments of all first-year students for the current academic year.

The allegations in the audit report and the resource difficulties of the polytechnic are two separate issues, but they are connected because ill feeling caused by the former has greatly exacerbated the latter.

Special local factors combined to cause such sour relations at the polytechnic. The first cited by the rector was local government reorganization which in 1974 turned the old town borough council, a friend of the polytechnic, into Kirklees Metropolitan Council. Council leader, John Mernagh, chairman of the governing council and of the education committee, and a polytechnic governor since it was founded, says the authority has always kept a tight hold on the polytechnic spending.

A second factor has certainly been the growth of the polytechnic at a pace too fast for administrative procedures. A third factor is that the polytechnic has failed to sell itself to the town.

A fourth factor has been difficult personal relations. The notes for guidance on the government of polytechnics left an onus on informal contact. The notes,

issued by the Department of Education in 1968 judged the critical issue of how much control local education authorities should have. Paragraph 5 says i.e.s. should settle the "broad range of courses" that "important responsibilities" must be discharged, and that polytechnics must be subject to controls in "financial, and administrative matters such as the approval of estimates, capital development and the level of fees". At the same time polytechnics should be "given all possible freedom in managing themselves".

The question left unanswered was just how much control the authority was to exercise through its minority representation on the governing council. In theory the i.e.s. had very drastic powers at its disposal; in practice the power to approve or disapprove estimates and the power to select items of expenditure for attention.

The issue is accountability. As Mr. Mernagh puts it: "It is a question of a local authority carrying out its proper function as far as spending is concerned. The audit report shows standards are less than are desired. There are slack about their procedures and we want a review." He added that the polytechnic could not expect to escape the ill-wind of cuts.

Confidential letters and documents show how the crisis grew steadily, particularly after the CNAA became involved following revocation of the music and mechanical engineering degrees. On July 1 the CNAA wrote to Mr Durrands setting out five conditions for re-approval of

the Music BA Honours degree. At the end of the month the CNAA wrote to Kirklees stressing the need for more funds for "a major national institution of higher education".

By August 29 the CNAA were writing that "in a situation described as 'getting by' it would be irresponsible to start any new courses, and strongly advising the polytechnic to drop all idea of expansion. After intense discussions between CNAA, polytechnic and Kirklees involving the switching of funds totalling £481,000 the CNAA felt able to lift the threat on enrolments. The CNAA found itself acting as a mediator between the two sides, a job that in theory goes beyond its Royal Charter responsibilities."

The CNAA is to discuss Huddersfield at a meeting of the Committee for Institutions next month and also decide to bring forward the next quinquennial review scheduled for mid-1982.

Resolution of the conflict could take a number of courses. The DES has already declined invitations to step in. Sir Frank Layfield, who is expected to carry out an investigation of the audit reports could emerge as a mediator, as could Mr. Eric Dixon, chief executive of Kirklees, who was in Zimbabwe on official duty when the row blew up earlier this year. The CNAA may be recalled. More drastic solutions would be a change of some of the fees involved, or an acceptance of greater i.e.s. say in polytechnic affairs.

## ... and the report that never reached anyone

The Government's modest proposals to help universities and colleges mount short mid-career courses, published last week and examined above, will not send the adult education world into paroxysms of delight. Yet the proposals flow directly from the dramatic planning exercise launched in 1978 by the Labour government which produced the notion called "Model E" and considered many champions of continuing education that the millennium was finally around the corner.

Model E was the fifth of a series of options which DES planners said the higher education system would have to choose from in the 1980s and 1990s. In those years, the day after the 1974 oil crisis, the world would, it was said, be a place of "energy, a large and unexplored surplus of resources and buildings with nothing to do."

Other models included holding the "bulge" of students in the 1980s out of higher education, so that the country would be able to absorb applications slumped in the 1990s, or teaching the bulge students on the cheap without increasing the size and cost of universities and colleges.

Neither option seemed particularly attractive, and the answer lay in the Government's discussion paper, *Higher Education into the 1990s*, favoured Model E, a course of action which promised to solve the problem of surplus capacity and reform higher education to bring it closer to new social groups and of different ages.

What Model E proposed was that resources, released, as numbers fell below the system's capacity in the 1990s would remain available for higher education and be used to accommodate more working-class

school-leavers, mature people and men and women in work—in other words, people who in the past have benefited little from traditional higher education courses.

The idea caused great excitement. It appeared to solve at a stroke the financial planning problems faced by the DES and open the way to a new and comprehensive higher education system which would no longer be devoted almost exclusively to the education of a small group of middle-class adolescents.

In May last year, however, Tory ministers swept into the DES with instructions to make cuts. In the new political climate, Model E and its successors were abruptly shelved, and the DES was left under a heavy cloud.

Under Secretary for Higher Education, never allowed the DES to continue its public planning exercise for the 1990s.

Publicly, the short and happy life of Model E ended there. But in the corridors of the DES, the planning exercise, which had been set up to take a hard-headed look at how the airy notions of Model E could be put into practice, was allowed to finish its work. Creation of the report was never without a certain air of mystery. The DES has, however, obtained a copy.

one of the Model's major aspirations—increasing the number of working-class school leavers in higher education.

"We think a distinction must be drawn between increasing participation in higher education by working-class school leavers and extending the opportunities for mature students whether they seek initial courses or continuing education," the report says.

The report suggests that the differential participation in higher education as between different social classes reflects decisions taken before the age of 18 and particularly 16, when decisions are made whether or not to stay at school or to enter employment or higher education services, which can do more than play a part in reducing this differential.

Many of the problems appear to arise in the home and the school and (apart from noting the present position) the report makes no attempt to suggest how the DES or the service teachers, which had been set up to take a hard-headed look at how the airy notions of Model E could be put into practice, was allowed to finish its work. Creation of the report was never without a certain air of mystery. The DES has, however, obtained a copy.

The team was named the Model E Reconnaissance Group and consisted of officers drawn from the DES, the Department of Industry, the Department of Employment, the Department of Science and Technology, the local authorities. As officials, they were interested in the practicalities, the nuts-and-bolts of the Model E, rather than the educational theories. And one of the first things their report does is dismiss

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"We think a distinction must be drawn between increasing participation in higher education by working-class school leavers and extending the opportunities for mature students whether they seek initial courses or continuing education," the report says.

The report suggests that the differential participation in higher education as between different social classes reflects decisions taken before the age of 18 and particularly 16, when decisions are made whether or not to stay at school or to enter employment or higher education services, which can do more than play a part in reducing this differential.

Many of the problems appear to arise in the home and the school and (apart from noting the present position) the report makes no attempt to suggest how the DES or the service teachers, which had been set up to take a hard-headed look at how the airy notions of Model E could be put into practice, was allowed to finish its work. Creation of the report was never without a certain air of mystery. The DES has, however, obtained a copy.

The team was named the Model E Reconnaissance Group and consisted of officers drawn from the DES, the Department of Industry, the Department of Employment, the Department of Science and Technology, the local authorities. As officials, they were interested in the practicalities, the nuts-and-bolts of the Model E, rather than the educational theories. And one of the first things their report does is dismiss

the legal profession is noted for its conservatism. The University Grants Committee is not at present noted for its generosity. Nevertheless, this document sees the inception of a post-graduate law diploma which will be a prerequisite for anyone wishing to practice law in Scotland.

This is the first major innovation in legal education for 20 years. Virtually every Scottish lawyer is university-trained. Traditionally, an LL.B. degree was followed by a part-time degree concurrent, with an apprenticeship in a law firm. This was replaced by a full-time law degree, followed by an apprenticeship.

The universities and the profession thought the changes had been made, as they generally meant the standards, says Professor Philip Love of Aberdeen's law faculty, and vice-president of the Law Society of Scotland.

But the law has expanded rapidly in new fields developing in environmental law, consumer law, EEC law, and more complex law.

The main task, the practical training of law, and practice, were equally through a separate route. The smaller numbers in the LL.B. could not justify a similar change.

Scotland law faculties fulfil their function: they provide an initial discipline and training in a method, and also teach the more traditional subjects. The LL.B. has been a success story. A great deal of new ones has led to a greatly enriched curriculum and has proved immensely difficult to emulate in a three-year LL.B. and all not well with the "polytechnic system." Under the LL.B. system, the apprenticeship was taken under the wing of an experienced practitioner, says Professor Love. But the sheer weight of the LL.B. has resulted in a number of economic recession.

## Law diploma put on the stand

Olga Wojtas puts the cases for and against the first major innovation in Scotland's legal education for 20 years

to know nothing at all about other areas of law. More often than not, solicitors are so busy they don't have time to train people."

Worried by the unevenness of training, the Joint Standing Committee on Legal Education, which comprises representatives of the universities, the Law Society and the Faculty of Advocates, issued a memo in 1974, suggesting a scheme largely the one just implemented.

The suggestions were based to a great extent on the Orinrod Report in England and Wales, not yet accepted south of the border, which recommended a more unified training of solicitors and barristers with an academic stage in a higher education institution, a professional stage at college, and continuing education.

The committee decided the degree curriculum should be restricted to the legal technical areas of the law, with the more practical subjects taught in a full time one year post-graduate course, with the emphasis on training by simulation.

Professor Love, however, of the committee, firmly says no. "The Scottish approach, began following the UGC for finance. In 1978, the UGC announced in an inconspicuous appendix that it had taken plans for the diploma into account when fixing recurrent grants."

"The diploma got through by the skin of its teeth," says Professor Love. "The policy decision was taken by the UGC just before the savings

began—if we'd been a year later, I don't believe we'd have got it. The diploma is now under way. Four obligatory courses have been transferred from the law degree: accountancy, conveyancing, procedure and pleading, and applied tax law. Legal practitioners are teaching several new practical subjects which include advocacy and pleading, management of companies and public administration.

"This is a year of concentrated study, under the guidance of the very best practitioners," says Professor Love. "Despite fears from some people, we've had no real problem recruiting tutors."

The diploma will be tested through a combination of continuous assessment and open book exams. "It will come as a shock to some students that whereas under graduates were able to opt out of degree classes, you can't opt out of the diploma, which effectively replaces a year of professional training," says Philip Love. "Attendance is essential. It's leaving through doing, so you gain his classes and then go away and mug up."

It would be naive, however, to expect that the diploma has been universally welcomed. Although now it is a fait accompli, the opposition is more muted. There is a general willingness, even among its opponents, to make it a success. But the pockets of resistance are still there.

"It depends on what you think a university is for," says John Sturrock, senior president of Edin-

burgh's student association, and former president of the law students' council. "I think it should be for the improvement of mind and ability in a general sense. This is bringing practical professional training into the ivory tower atmosphere. I don't think it's the right place for lawyers to learn about being lawyers."

There is a similar scepticism among many of the profession. "After a year of the diploma, you'll still never have met a client or answered the phone. No way can you teach the practice of law in university surroundings," says one solicitor.

The diploma is not intended as a complete substitute for training in a legal firm, however. Diplomates will still have to train for a further two years, although the antiquated "apprenticeship" will be replaced by "trainee" status. But the diploma will mean an enhanced salary. Apprentices' salaries have always been notoriously low. Now, a diplomate's starting salary will be £3,250, compared with the £2,900 of a second year apprentice.

"If firms pay them more, they're going to get their money worth out of them and use them for proper work, not making the tea and running errands," says Professor Love.

But while there was a prescribed minimum for apprentices' salaries, the Law Society has dared only to recommend a minimum for trainees. And there have been murmurs of rebellion among law firms. Some

say they won't pay it; some even say they won't employ as many trainees in future.

Given this attitude, it is not surprising there have been no moves to implement what everyone agrees would be the best system of training—sandwich courses divided between university and law firm. Firms have got used to their full-time apprentices, and no money would be forthcoming from the Scottish Education Department for block release professional training.

Many people are astounded that the DES should pay for the diploma, a qualification for a profession. "The profession is abdicating its responsibility for training and putting it on the state," says a solicitor.

One can justify public financing of a more consistent training for lawyers, presuming the public will benefit directly from it.

But the Scottish Legal Action Group, a reformist body consisting mainly of academic and practising lawyers, has severely criticized the diploma for the glaring absence of welfare and social law. In a strongly worded submission to the journal, *SCOLAG*, it said: "One would think on looking at this law syllabus that the hundreds of thousands of Scots living on state benefits in council houses were modern serfs with no legal personality."

The concept of the diploma is excellent. Apprentices have in the past been left blindly struggling with work they do not understand. Diplomates will be more expert in a broader area than is possible at present.

But if the universities are truly concerned to produce diplomates who can give a better service to the country, they must have the courage to ensure that the curriculum includes more in its 400 hours which is of direct relevance to all sections of the community, including the poorer and weaker, than 10 hours on legal aid.

John Sturrock







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## BOOKS

## Darwinian theory in its philosophical context

**Darwinian Impacts: an introduction to the Darwinian revolution** by D. R. Oldroyd  
Open University Press, £7.95  
ISBN 0 335 09 001 X

The literature on Darwin's ideas and their impact on the world is now truly gigantic. "But if one wants to find a single book that deals with the Darwinian theory of evolution, the way in which it fitted into the history of Western thought, its subsequent influences, and the general consensus among contemporary scholars as to the status of the theory and the role it plays in biology, then it is hard to know where to turn." David Oldroyd's very true words both describe the present situation and give the justification for his book. It is a heroic effort to compress within 400 pages a readable account of these topics.

Part I, "Antecedents of Darwinism", discusses early views on man in relation to animals, modes of classification, the great chain of being, Linnaeus, Buffon, Lamarck, Cuvier, Lyell, the *Naturalist's* *Philosophy*, Chambers, Paley and Malin. Part II, "Darwinism", deals with Darwin's life and work (briefly), the *Origin of Species*, Wallace and Darwin's joint work, the logical structure of the Darwin/Wallace theory, criticisms of it in the nineteenth century, Darwin's later work with special attention to his theory of pangenesis, Mendel and the synthetic theory of

evolution, and neo-Lamarckism.

Part III, "Consequences of Darwinism", deals with the public reception of the *Origin* (in the nineteenth century), Herbert Spencer, social Darwinism, Darwinism and politics, thenology, philosophy, psychology, anthropology, literature and music, ending with "Concluding remarks and personal reflections". Lastly comes an appendix "Some Historical Considerations" which gives Oldroyd's methodology and should be placed and read first in the book. Suggestions for further reading are extensive, and there are copious notes to each chapter which will bring the reader up to date in the historical and philosophical aspects, except that the strength of fundamentalism in the New World is underestimated. Although so packed with information, references, comments and discussion—the author himself describes one section as a rather breathless scamp—the book is very readable and well presented. Proof-reading was not too thorough (one is grateful for the bookish Kant as "immanant" and the least satisfactory feature is the text-figures, several of which need further explanation and one or two are partly unreadable).

The book is an exercise in the history of ideas as explained in the appendix, an attempt to assimilate ideas in the context of their time. In this Oldroyd indicates that he is following A. O. Lovejoy, author of *The Great Chain of Being*, and is severe on those scientists turned

historians who seem concerned only with disentangling truth from error using the standards of their own day.

This can certainly be overdone, but one must be careful not to throw out the baby with the bathwater. Lovejoy was a philosopher dealing with philosophical ideas for which there are no empirical tests and no hope of certainty. Science differs from all other human activities in that, very slowly and after much controversy, some arguments can be settled. There is progress in science, with wider and wider explanations being found for more and more phenomena, which cannot be said of philosophy. Oldroyd is so interested in ideas—those of Bergson and Rudolf Steiner as much as those of Darwin and Mendel—that it is not always clear what he regards as legitimate developments of evolutionary theory, what as mere employment of it as a pretext, and what downright lunatic fringe.

Oldroyd is almost the only philosopher I know who has understood the significance of Kettlewell's work on the famous industrial melanic moths, which disposes of the nonsense about the survival of the fittest being a tautology and untestable. Yet (it seems almost ungrateful to say it) the biology is perhaps the least satisfactory aspect of the book. The attempt to estimate "the general consensus among contemporary scholars as to the status of the theory" (largely confined to one chapter) gives no

idea of its present highly developed maturation and explanatory successes in fields such as speciation, population biology and animal behaviour. Equally, he is liable to miss the full force of the scientific evidence in earlier contexts.

For example, he pays comparatively little attention to the evidence from geographical distribution and from vestiges whether in Buffon, Erasmus Darwin, or the second half of the *Origin*. It was these subjects that unsettled the thinking of many in the eighteenth century as well as the nineteenth; and it was the second half of the *Origin* which slowly convinced people of the validity of evolution, even though many rejected the mechanism of natural selection.

Similarly, in dealing with Lamarck he has not appreciated that the inheritance of acquired characters was a commonplace in the eighteenth century—Erasmus Darwin made great play with it—and Charles Darwin cannot have thought of it as peculiar Lamarck (to ascribe it to him, as is so often done, was Samuel Butler's error).

Lamarck's idea of necessary progression in evolution, as the result of caloric in the lowest forms and caloric plus effort in the rest, was specially Lamarckian and was based on the idea of a ladder of progress that were ludicrous in his own day. Cuvier was right scientifically at the time in much (not all) of what he said about Lamarck, and Darwin was right in describing necessary progression as put forward by

Lamarck as nonsense; he was equally right in appreciating Lamarck's labours in classification.

Perhaps it is not surprising that Oldroyd recommends Gertrude Himmelfarb's book *Darwin and the Darwinian Revolution* (published in 1959); he says that critics "tended to depreciate" it and made much of the fact that it was not written by a person with specialized biological knowledge, and also, perhaps, because it dared to write critically of Darwin on occasion. The fact is that anyone can write critically of Darwin if they have genuine scientific criticisms to make (I have done so myself) but criticism arising out of plain ignorance of evolutionary work in this century does not and cannot command respect. Writing the history of science is far more difficult than most philosophers and historians (and some scientists) seem to realize: the ideas cannot just be abstracted from their concrete and messy history. The best piece of history I know is in S. J. Gould's *Ontogeny and Phylogeny* (Harvard, 1978). But as an introduction to Darwinism and its influence on scientists, philosophers, the world in general and its lunatic fringe, Oldroyd's book is essential reading.

A. J. Cain

A. J. Cain is professor of zoology at the University of Liverpool.

## Food microbiology

**Microbiology of Foods** by J. C. Ayres, J. O. Mundt and E. C. Sanderson  
Freeman, £10.80  
ISBN 0 7167 1049 8

At a time when books on food microbiology are becoming relatively common, the approach taken by new authors is of particular interest. Is their book mainly a compendium of commodities and the micro-organisms thereon or have they attempted to interpret the dominance of certain micro-organisms on particular foods in terms of an interplay between the physiological attributes of the main contaminants and the physicochemical properties of the substrate? As the current debate among European food microbiologists centres mainly on the vexed question of the statistical validity and the utilitarian value of "standards" set on traditional methods of sampling and testing, it would be a bonus indeed if a new book contained a thorough discussion of the contribution of analytical microbiology to the wellbeing of urban man.

Ayres and his collaborators leave no doubts about their objectives; they state in the preface that they have attempted to provide a textbook that embraces the available information about food microbiology. Indeed, they appreciate that should their attempt be successful, this book will be to contemporary food microbiologists what Tanner's *Microbiology of Foods* was to those who learnt and practised the discipline in the 1950s. The authors identify a heterogeneous readership: advanced undergraduates, beginning graduate students, beginning microbiologists, and even lay-readers. The first chapter (40 pages) of general information about food microbiology is a welcome feature. The rest of the book deals with the classification of bacteria, yeasts and moulds and the text is supported by line drawings (good) and photographs (not so good). Although the space allotted must necessarily result in a superficial treatment, the information sought to provide a minimal training in microbiology will not be helped; however, the bibliography, because there are few references to recent reviews of microbiology, is covered from foods. For example, the genus *Aeromonas* is not listed in the index. Many of the genera noted in this chapter are associated with specific changes in foods in recent days that survey epizootic and zoonotic diseases of

Although the text (100 pages) covers a broad spectrum, many useful definitions are given and the latter claim to be comprehensive in relating the success of spoilage organisms to the nature of a food or the methods used for its preservation. Standards are touched upon rather philosophically, the case for resting on Elliott and Mitchenor's statements that "the commonest cause of food spoilage is inadequate control of the environment" is a little, perhaps the failure of the editor to contain the enthusiasm of an author for his subjects.

The authors adopt a broad interpretation of fermentation, the topic of the second part of the book (90 pages), and the text races along in discussions of the production and spoilage of wine, beer, hard cheese, bread, vitamins, cucumber vinegar, miso, sake, tempeh and so on.

The metabolic pathways, flow diagrams and photographs are useful adjuncts to the descriptions of processes but I would have liked more guidance as to the intended purpose of the "boxes" of explanations inserted by lines from the rest of the text.

Part three (278 pages) deals with the microbiology of commodities from spoilt eggs and sea products. Although little space is available for each commodity, there are account emerges of the microbiology of these commodities.

The last part of the book, 112 pages, covers non-microbial food-borne diseases (indigestion, allergic reactions, food-borne infections, and fungal food-borne infections). An adequate index should assure ready entry to the text.

The outline of the contents of the book indicates that the authors have painted a broad canvas. The question that needs to be asked is have they been successful in food context of American technology, science and food. The answer seems to be "no". Microbiology is relatively unknown in British Universities and will not be much demanded from undergraduates. In the United States, it is a major subject, and it is available to undergraduates who do project work, or food microbiology, technology or food microbiology.

R. G. Board

R. G. Board is senior lecturer in biological sciences at the University of Bath.

## BOOKS

## Each tiny brush stroke

**Essentials of Physiology** by J. F. Lamb, C. G. Ingram, I. A. Johnston and R. M. Pittman  
Blackwell Scientific, £5.80  
ISBN 0 632 00529 7

Students of physiology demonstrate the same high levels of biological variation as any other group of not quite randomly selected subjects. It is self-evident though their teachers learn patterns are also very diverse. This must be the justification for yet another standard text book in physiology aimed at "students of science, medicine and dentistry, and allied professions". How does the *Essentials of Physiology* differ from all the others? What have Professor Lamb and his colleagues contributed to a new approach to learning this essential and intriguing basic medical science?

They claim that they have written a short book, to encourage students to read it: 420 pages is short by the standard set by the earliest complete text in English, that of Scott (1889), which came in at 500 pages. This book, containing well over 1,000 closely printed pages, or Scott's classic text which, from its first fourteen edition, exceeded 1,000 pages. However, there has been a fashion for claiming that modern texts have 400 or 500 pages. In this respect this volume is not exceptional.

Their chief claims to originality are that they have "predigested the usual information" and that it is presented in graphs and diagrams "as simply and concisely as possible". The latter claim is sustained by the facts: the book abounds in graphs and diagrams, albeit that some of the former have unlabelled axes (a bad habit which needs no comment), while to this student some of the diagrams are incomprehensible. It could be that this is just another sign of biological variability. A clear, simple diagram to some is a meaningless maze of lines to others. Nevertheless, by and large for the visually inclined who rely on the reinforcement of word by picture this book offers an excellent way to learn.

What of predigestion and the commonly claimed virtue of presenting concepts rather than facts? It is too easy from the safety of the armchair to be critical, yet one is

entitled to judge by the authors' own standards, though the agony of writing was theirs. There is little evidence for outstanding achievement in presenting concepts, though some difficult ideas are clearly explained. For instance, counter-current exchange in the kidney is elucidated by the use of analogy, and the complexities of muscle spindle function are elegantly laid bare.

Perhaps best of all, the reader is, from time to time, given small rewards—like the rat (page 266) who, though he seems to be operating a computer, is just a rat, burrowing. These tidbits, like the speculation that with just a little more auditory acuity we could hear our heads vibrating as we walk, or the astonishing fact that the pulmonary capillaries are 1500 miles long are pegs upon which the ordinary reader can hang ideas. The sad fact is that there are too few such memorable tidbits: the floundering student is given little support, remaining in danger of drowning in a sea of facts.

The organization of the contents into parts and chapters beginning with basic properties, through maintenance systems to integrations, seems at first sight novel and interesting. In practice it is just a re-arranged version of the standard format—cells, nerves, muscles and the systems.

Do all writers of physiological texts visiting a gallery examine the structure of the canvas, the composition of the paint and each tiny brush stroke before looking at the whole painting? The fascination of physiology to the majority, is as a tool to unravel the ways in which organisms adapt to their environment. Thus, it is less interesting for the professional biologist who takes precedence over the parts. Only the professionals become totally absorbed in some intriguing detail, but they detail. It seems perverse, therefore, to relegate exercise and climate to the end of the book, as if they were extraordinary details. In this book, as in so many others, the preferred path to understanding is along the path of the study of basic details, concluding with a rather casual glance at overall phenomena. This indicates a state of pedagogical arterial sclerosis, or at least indigestion.

Rainer Goldsmith

Rainer Goldsmith is professor of physiology at Chelsea College, London.

## Botanical zonation at the poles

**The Arctic and Antarctic: their division into geographical areas** by V. D. Aleksandrova  
Cambridge University Press, £15.00  
ISBN 0 521 23119 1

Although they are often treated as very similar, the Arctic and the Antarctic are very different areas in both climatic and biological terms. Opportunities for individual scientists to work extensively in the Arctic and the Antarctic have been very limited, so that comparative assessments of the two regions are rarely based on personal experience of the differences. This is the case in the present volume and accounts for some of the inadequacies.

V. D. Aleksandrova has worked in the Soviet Arctic for over forty years and can be regarded as the foremost authority in the vegetation of the tundra regions of the USSR. The tundra of tundra within the USSR is a great deal, in either the Arctic or Canada, and as it contains representatives of most community types this is a good position to attempt a synthesis for the Arctic. The relative amount of space devoted to the two regions are functions both of the extent of the available literature and of the personal experience of the author. The present volume contains 421 pages on the Arctic and only 18 on the Antarctic. Her coverage of the available literature is not extensive, especially for the Antarctic but of not 35 references, 34 are Russian. This review of the major Russian papers now makes available much of the voluminous information on the Russian tundra that has never been translated and has only been largely ignored by Western biologists.

Alexandrova's papers, like those of other Russian biologists, are

chapter to an examination of the criteria to be used in defining the geographical areas. The Russian classifications for Arctic vegetation have generally been based on dominating lifeforms, for example, lichen-tundra, in contrast to the general Western usage of the degree of closeness of the vegetation. Neither of these is very satisfactory for the range of Arctic vegetation, and this has caused Aleksandrova to use a complex of features including the composition and character of the structure of synusia together with the lifeforms of dominant species. This has allowed her to propose in chapters two and three a far more detailed classification of vegetation types within her tundra and polar desert regions than has previously been attempted for the whole of the Arctic. Notable exclusions in the area covered are the southern tip of Greenland and Iceland. Although not suit all requirements, it is an important attempt at synthesis for what is often unjustly thought of as a homogeneous ecosystem.

The treatment of the Antarctic and sub-Antarctic vegetation in chapters four to six is not as satisfactory. In spite of the much more limited literature, the major paper on Prince Edward and Marion Island is not referred to, nor is the major Antarctic biological Programme International symposium, which contains many descriptive descriptions of many tundra sites. There are no references to vegetation descriptions for either the Kerguelen or the Crozet Islands. She is mistaken in suggesting that the sub-Antarctic soils freeze below 5 cm and that patterned soils are not found. The vascular flora does not show a high degree of endemism, nor do the cushion plants domi-

ate the vegetation of all the islands. Although a large number of alien species have been recorded from these islands, the literature states quite unequivocally that the majority have not survived. Accepting her contention that there is no Arctic region with an analogous flora, there are other areas within the Southern Hemisphere, for example, Gough Island and the Auckland Islands, which carry similar vegetation types but are not mentioned. The remainder of the Antarctic she classifies as analogous to the northern polar desert, and divides it into northern and southern sub-regions; her treatment here is brief but reasonably inclusive.

The final chapter of conclusions is too short. Far more could be made of the data she presents, especially by the use of more diagrams. Some of the maps are on too small a scale for their details to be clear; there is no list of illustrations, and a short glossary would have been useful. On the positive side the translation is good, misprints are very few, and the indexes are comprehensive. Despite the drawbacks mentioned above, Professor Aleksandrova is to be congratulated on making a good attempt at providing the first comprehensive synthesis of the vegetation of the polar regions. She has identified areas with inadequate data, provided a conceptual framework, and made available much previously unused Russian literature. An important book both for the polar biologist and the general physiogeographer.

D. W. H. Walton

D. W. H. Walton is a principal scientific officer with the British Antarctic Survey, Cambridge.

## Diversity of animal life

**The Complete Encyclopaedia of the Animal World** edited by David Burn  
Octopus, £12.95  
ISBN 0 7064 0950 1

There is a bewildering array of books on the market which survey the animal kingdom. Most of them are designed to give the reader a quick glimpse of the animal world, but this volume is no exception. What makes it different from many other encyclopaedias is that the text has not been hastily compiled simply to act as a vehicle for the illustrations. David Burn has spent two-and-a-half years compiling the work and has got together experts in all the animal groups, mostly research workers and university teachers, to produce an excellent introduction to the million of animal species in the world today.

The main body of the book is a traditional survey of the animal phyla starting with the simplest

forms of life, like the protozoa, and then working through the invertebrates and vertebrates to the mammals and birds. The text is written in a simple, clear style, and the illustrations are of high quality. The book is a valuable addition to the shelves of libraries and individuals alike. It is a book that should be read by all who are interested in the animal world.

The text for each group begins with a description of the various species in the phylum and then goes on to show their structure, physiology, feeding behaviour, life histories, and habitats. The

fossil record is discussed and evolutionary relationships between the different groups are noted. The text is written in a simple, clear style, and the illustrations are of high quality. The book is a valuable addition to the shelves of libraries and individuals alike. It is a book that should be read by all who are interested in the animal world.

The colour photographs, which appear on almost every page, are all the more attractive and informative because they show the animals doing something interesting. A yellow spider, blending perfectly with the petals on which it sits, is devouring a bee which was attracted to the flower to collect pollen. A sun spider rips a beetle apart. A scorpion carries its young on its back and a velvet worm gives birth to live young, which can be seen emerging head first from its body. A brown bear sweeps a person up from a torrent and a bushman cures up an antelope in the desert. This main part of the book provides an inspiring and scientifically sound introduction to the diversity of animal life, from the amoeba to the whale, and will be useful for schools and introductory university courses, as well as for the layman.

There are also good sections on animal distribution and survival strategies. It is shown how movement of the continents helps us to interpret present-day distributions of some animal groups; and on a finer scale, ecological principles are summarized to explain how the various species occupy different niches and can coexist in communities. It is a pity that the introduction to the book, by V. C. Wynne-Edwards, continues to champion the view that animals have evolved ways of increasing their population growth so as to maintain the balance of nature, an idea with which most biologists would strongly disagree.

The encyclopaedia ends on a depressing note with a section on conservation. With so much of the world's natural habitats destroyed and so many of our more spectacular animals, like the tiger and humpback whale, driven to near extinction, it would be a pity if our only chance to appreciate the diversity of life illustrated in this book would be to visit a nature reserve or a zoo.

Nicholas Davies

Nicholas Davies is a demonstrator in zoology at the University of Cambridge.

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# BOOKS

## Primroses, people or penguins

Evolution in Age-structured Populations  
by Brian Charlesworth  
Cambridge University Press, £18.00 and £5.95  
ISBN 0 521 23045 4 and 20786 9

The general reader can be forgiven for asking why, if evolution is so well understood, it is necessary for biologists to continue to write so much about it? There are two principal reasons. The first is that nature is wonderfully subtle, the second that there are still a number of important, unsolved problems lurking behind the established principles. Some arise from observations of curious naturalists, who see phenomena difficult to explain within the existing theoretical framework. Others arise by deduction in the minds of inquiring theoreticians: the present book belongs firmly in this latter category.

Populations of most species of organisms are age-structured: that is there are several, overlapping cohorts whose life-styles depend upon their ages. Young and old organisms share a fate, but grow and die at very different rates, and need to be a particular size before they reproduce. It does not matter whether we are dealing with primroses, people or penguins—most populations are age-structured. Surprisingly, there have been no previous attempts to review the ecological, genetical and evolutionary consequences of age-structure in a coherent way. There is a large scattered and growing literature, but no synthesis. Brian Charlesworth's book is therefore unique. The age-structure of a population influences important theoretical phenomena (genetic drift and evolution of optimal life-history characteristics, for example), as well as having a direct bearing on practical problems in plant and animal breeding. The whole question of why organisms age is but one facet of the broad sweep of problems subsumed

by the title of this book. The main point of it is to ask: what happens if we insert age-structure into theoretical models of population dynamics, population genetics and evolution? What new predictions emerge? What old ones fall? And to a lesser extent, how well do the models stand up to empirical tests? Chapter one is a general survey of the basic mathematical theory of age-structured populations—a primer in modern population dynamics. It considers what types of models are appropriate for what sorts of populations, life-tables in theory and practice, the concept of "reproductive value", density-dependence, stable age-distributions, and so on. The coverage is rigorous and comprehensive, setting the context of the book very firmly in the dynamics of single species populations.

Genetics enters in chapter two, with a consideration of the effects of age-structure on Hardy-Weinberg equilibria, and an exploration of the effects of genetic drift on populations of finite size. This chapter finishes by an excursion into the intriguing problem of the chances of close relatives marrying in a human population.

Chapters three and four move on to consider the theory of frequency change and equilibrium under natural selection—the core of evolutionary theory—in age-structured populations. As hoped for, some of the results strike at the foundations! For example, the concept of "fitness", which all biologists use so freely, proves a will-of-the-wisp when measured rigorously under different assumptions. Indeed, I think this insight is the most important and worrying one in the whole book. Almost as important are Charlesworth's comments on the maximization of total population size under selection, where results can again be counter-intuitive.

Finally, chapter five looks at the evolution of life-histories: for example, why do some species

breed once and then die (eels, for example) and others many times? This chapter also deals with the general problem of senescence.

I had to work hard and think hard to get through many sections, and some will require, and repay, more detailed study. The book assumes a sound working knowledge of the basic principles of population biology and genetics, and of the mathematics of matrix algebra, finite difference equations and calculus. It will not be accessible to most general readers or naturalists, despite what it says on the dust-jacket; I also think it is too advanced for an undergraduate text. In other words it is very definitely a book for postgraduate students and research workers.

How important is it? I suspect that part of the intellectual attraction of theoretical population genetics rests upon the abstract beauty of the mathematical proofs. But one sometimes has to use extremely sophisticated techniques to solve rather restricted problems. For example, if age-structure effects in single species populations are almost always swamped in the real world by the vagaries of the environment, interactions with other populations, and shifting, unpredictable selection coefficients, then the edifice is elegant but fragile.

However, this is not a criticism, as we do not know whether these things happen. The whole point of good theoretical science is to identify clearly a set of problems, pose them in a soluble way, and leave the world to argue about the results! By focusing so admirably upon one aspect of evolution, Brian Charlesworth has written a book that will provide food for thought and debate for years to come. One cannot really ask for any more.

John H. Lawton

John H. Lawton is senior lecturer in ecology at the University of York.



Male red squirrel. Illustration taken from *Squirrels in Britain* reviewed on the facing page.

*Squirrels in Britain*  
by Keith Laidler  
David & Charles, £6.95  
ISBN 0 7153 7825 2

For many suburban dwellers a grey squirrel pilfering scraps from the bird-table is a pleasantly acrobatic sight, although one whose agility is shadowed by the sneaking suspicion that this immigrant from America has played some nefarious role in the demise of our native red squirrel. But behind the scampering antics of each squirrel is a network of subtle adaptations through which evolution has groomed it for survival: squirrels use their scissor-like lower incisor teeth to crack nuts, send messages to each other with a series of shrill, thrashing tails projected by stamping feet, and eat about two million pine seeds each year! These and other adaptations are the material of Keith Laidler's book.

The 13 chapters and four appendices embrace diverse topics, spanning biologist's voyeuristic glimpses of an arboreal family life, through the story of curious whims that led to a fashion for introducing and fostering the grey squirrel in the English countryside in the early twentieth century, and on to the sometimes strained relationship between man and squirrel today. Foresters fight to reduce squirrel damage to the form of bark-stripping in plantations; the squirrels are reputedly foraging for nutrients in the plant's vascular system when they strip the

bark from trees in their commercial prime. Indeed, the reputation of various species of squirrel is pretty tarnished today—ground squirrels in Russia are a pest of cereal crops and retaliation in the form of seeds laced with poison apparently accounts for 150 million of the pilferers annually.

There is no doubt that among the pages of this book there are intriguing observations and some provocative explanations. One might puzzle, for instance, on the intricacies of squirrel society that are reflected by the mating chases during which as many as 30 males may stream through a woodland in pursuit of a single receptive female. The four pages of bibliography to the book indicate that much of squirrel behaviour has fallen under scientific scrutiny; nevertheless, having read the text, I did not feel any nearer to getting inside a squirrel's skin. Perhaps the absence of any citations in the bibliography to work by the author himself on squirrels underlies the rather anonymous feel to the book.

This book is not one which presents the insights of a naturalist's personal observations; indeed, there is little evidence from the text that the author has ever done anything more than write about it. However, the author has done a reasonably thorough review of the literature and has clearly made a serious attempt to do so in a style that anyone can follow. The book is illustrated by colour and black-and-white photographs and by line drawings.

D. W. Macdonald

D. W. Macdonald is a research fellow in the department of zoology at the University of Oxford.

## For honest labour made

Hands  
by John Napier  
Allen & Unwin, £12.50  
ISBN 0 04 611 004 6

This is a work intended both for scientist and non-scientist, and as such would run the risk both of frustrating the specialist and baffling the layman. By and large, however, Professor Napier manages to provide a successful compromise between complexity and oversimplification, due in no small measure to a lively and witty style of writing. Indeed, the book is well seasoned with humour and I found myself laughing out loud at several points in the text. Another major attraction which will find favour with many readers is the use of more than 50 illustrations, including many excellent and informative photographs, some photocopies of famous works of art and a number of original line drawings.

The work is in two sections, part one being largely structural and functional, comparative and evolutionary in content, whereas part two deals more with socio-cultural patterns. Although most of the first half of the book is thus distinctly biological in flavour the second half follows on naturally enough with chapters on handedness in man and the other primates, on the details of fingerprints and their forensic significance, and on gestures and other forms of manual communication.

After short but adequate attention to terminology, chapter two continues with an account of the digits and digital formulae, giving due acknowledgement of the classical writings of Wood Jones. Following a comparison of the phalangal formulae of human and ancestral fossil hominid hands and other argument, the author is constrained to say of the thumb: "Indeed it is questionable whether it has ever possessed more than two phalanges." A conclusion which will no doubt infuriate the legions of anatomists who collectively have expended much time and energy trying to determine whether the missing element of the thumb is a phalanx or a metacarpal. Although it is clear that the latter part of this statement could have been better put, it is not surprising that Napier does not provide further comment on the complexity between poles and failure in the number of their specification and the conformity of this to the phalanx pattern in other words it is curious that he does not enlarge upon the facts of the case before making the point that there are some differences between the turns of phrase in a number of



Giant Panda's hand showing false thumb, used for clutching bamboo shoots while feeding. This rather special case of polydactyly was first demonstrated in 1942 by Wood Jones, who showed using X-rays that the panda's "thumb" is simply an enormously enlarged wrist bone called the radial sesamoid. The thumb is capable of restricted and very simple movements. Original line drawing from the Field Museum of Natural History, Chicago, taken from Hands.

places, as when describing palmar skin flexures as "hinges which open and close" and again in the analogy to "the human club" with reference to the skin papillary ridges. However, the statement: "nails are the barometers of ill health"—is not only alarmist but is, as the author must know, a gross clinical exaggeration.

Catering to the needs for a varied readership one can appreciate the author's dilemma in dealing with the internal anatomy of the hand, especially the soft parts. Inevitably the account is incomplete, as is the labelling of the hand dissections (pages 62 and 63). In spite of these anatomical deficiencies a very good functional concept of the hand emerges, although I could see little point in separating the discourse on the thumb into a subsection "Movements of the Thumb" in chapter 3, from another subsection "Opposition" in chapter three.

As Napier has already contributed much to our knowledge of upper limb function, it is not surprising that those parts of the book dealing with problems in both evolutionary and contemporary terms are particularly informative. The discourse on grip should be required reading for all manual tool designers! None the less, such a sentence as: "The ulnar nerve supplies the bulk of the power to go to muscles and can be referred to as the nerve of power" will strike anatomists and physiologists as patently inappropriate. With proper reference to Dart,

J. D. Lever

J. D. Lever is professor of anatomy at University College, Cardiff.

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## Small mammal ecology

Ecology of Small Mammals  
edited by D. M. Stoddart  
Chapman & Hall, £15.00  
ISBN 0 412 14790 4

Dr Stoddart has brought together an impressive set of authors to write on eight different aspects of small mammal ecology. The book has little direct competition and will make a useful complementary text to the International Biological Programme volume on *Small Mammals: their productivity and population dynamics*, edited by Golley, Petruszewicz and Ryszkowski (Cambridge University Press, 1978). It should also become a basic text for many undergraduate courses which include mammal ecology, as students will find it generally easy to read and it gives much of the theoretical background to the subject.

Six chapters are devoted to particular aspects of pure and applied ecology and a further two chapters cover the ecology of bats and small marsupials. At first sight it seems odd that the two chapters on bats and small marsupials have been inserted into the other six, as these have a general coverage of species, including their life histories. However, these two chapters serve to emphasize the importance of those groups which are all too often studied by the rodent-orientated ecologist.

The editor acknowledges that the decision to limit "small mammals" to those weighing 5 kilograms or less is an arbitrary one and he states that the guideline has not been allowed to separate a large mammal from several small cousins. Indeed Dr Stoddart, in his chapter, allows himself the luxury of giving examples (with apologies) to small size his argument and there is much in the book which would be of interest to the ecologist.

Most generally applicable chapters in terms of relevance to species other than small mammals, is the first, on life-history attributes. T.H. Whittington provides a useful

account of the evolution of these strategies (a strategy being defined as a suite of adaptive responses that a species accumulates over evolutionary time), acknowledging (individual, kin and group selection. He then reviews the demographic components of life-history strategies, giving theory and specific examples. The pattern of theory followed by empirical data is repeated in a consideration of the evolution of food habits and food niche breadth, the evolution of energy metabolism (homeothermy versus heterothermy), and the evolution of habitat selection and social organization. Flouting recognition that "life-history" is conventionally only the demographic characteristics of a species but manages to convince the reader that the physical, energetic and social environment should also be considered. The style is authoritative and the reader is left with a clear picture of the possible life-style options open to be exploited.

Southern's chapters on population processes and the stability and instability of small mammal populations are more relaxed in style but just as absorbing as the first. It is refreshing to read an up-to-date discussion of small mammal population ecology written by someone who can see the wood from the trees and who is not biased towards his own pet theory.

G. F. Hayward and J. Phillipson provide a more pithy and complex exposition of the functional role of small mammals, and include species composition, species diversity, relationships between vegetation and primary consumers, their role as prey and their energy budgets. Perhaps the most surprising conclusion is that "consumption per se represents a negligible part of the impact of small mammals on ecosystems and that the greatest impact lies in the indirect feedbacks such as burrowing and trampling". It is to be hoped that this statement will stimulate new research.

The chapter on small mammals as vectors of disease by R. E. G. Cook includes a brief description of

many small mammal zoonoses (diseases and infections which are naturally transmitted between vertebrate animals and man), the epidemiology and their control—only half the space allotted to one of the other contributors. The section should be congratulated on putting so much into so small a space, which the reviewer also finds a guide to the literature and relevant bibliographies. A. Myllymaki also writes to illustrate the topic of small mammal pest problems and their control, rather than give a comprehensive reference list, again good use is made of references to review articles.

J. Galsler's chapter on bat ecology includes habitat requirements, foraging strategies, hibernation, colony reproduction, population ecology and community ecology. The chapter is very instructive but I found the colour into formulae before Table 7.5 difficult and disappointing. The table gives the results of 1000 of these Lincoln Index and 1000 formulae to a bat population, but unfortunately many of the figures are inaccurate.

The final chapter on small mammal ecology by C. H. Tindale-Bischoff is more unconventional in its content, the author keeping the reader's attention by the variety of the text rather than by its content.

Although the book is generally sound I must point out some minor errors and inconsistencies which detract from its usefulness as a teaching text. Most important are the inconsistencies between and within the life tables. The tables are taken from the same squirrel studies but the survivorship series are not from different bases (1000 and 1.0). This is excusable, but there are also many inaccuracies in the death rate columns of both tables.

J. R. Flowerdew

J. R. Flowerdew is lecturer in the department of applied biology at the University of Cambridge.



## BOOKS

## Before the mathematical era of biology

**Evolution for Naturalists: the simple principles and complex reality** by Philip J. Darlington. Wiley, £12.25. ISBN 0 471 04783 X.

**Darwin, second edition** edited by Philip Appleman. Norton, £3.75. ISBN 0 393 95009 3.

Darwin did two things for biology in the *Origin of Species*: he built a framework on which to hang and link an enormous array of observations, and he provided an interdependent coherence for a clutch of disciplines as distinct in their methodology and language as paleontology, molecular biochemistry, environmental physiology and the mathematics of populations.

It is the former which normally springs to mind when we think of post-Darwinian biology. Samuel Coleclough died in 1834 while Darwin was sailing round the world in the *Beagle*, concerned that zoology was in danger of falling apart because of its huge mass of uncoordinated factual information. Forty years later Darwin read Malin's essay on the *Principles of Population* and connected his own observations on variation with the idea of a struggle for existence. He wrote to Hooker at that time, "I was so struck with the distribution of the Galapagos organisms, etc. etc. and with the character of the American fossil mammals, etc. etc. that I determined to collect blindly every sort of fact which could bear in any way on what are species. I have read heaps of agricultural and horticultural books and have never ceased collecting facts. At last gleams of light have come, and I am convinced (quite contrary to the opinion I started with) that species are not (it is like

confessing a murder) immutable". In June, 1842, Darwin allowed himself "the assistance of writing a brief abstract of my theory in pencil in thirty-five pages".

But the "other" and perhaps greater Darwinian achievement in biology has been to bring academic rigour to component disciplines. This emerges in a negative way from Darlington's *Evolution for Naturalists*. Darlington is a distinguished biogeographer, retired from a chair of zoology at Harvard. He says of himself that his "formal education" was completed in 1931, before the mathematical era of biology had well begun, and long before the explosive evolution of molecular biology. He writes: "The biologist with the best perspective on evolution as a whole is, I think, the naturalist who looks directly at what is going on in the woods, fields, and waters around him, provided he keeps up reasonably well with at least the general trend of new discoveries and theoretical advances at all levels from molecular genetics to the theory of faunal equilibria. My method is to pursue the naturalist's path, whenever I can. I shall derive and test hypotheses and models of evolution by what I can see, or think I see, in the real world."

This approach of Darlington's is the freshness of his book, but at the same time its weakness. It is pleasant to get away from models of population dynamics, arguments about enzyme function, descriptions of selective forces, and the like, which make up so much of books and courses on evolution, but it is none the less strangely unsatisfying. The method is to pursue the naturalist's path, whenever I can. I shall derive and test hypotheses and models of evolution by what I can see, or think I see, in the real world."

much of the controversy on the subject over the past 20 years, and correct to judge that it has been "ignored, misunderstood, or over-emphasized by different evolutionists", but on shaky ground to claim that it is "important in itself and doubly important because it is important in man". Statements like this need to be very carefully supported, much better than "A few examples of deme-group replacements have been described formally... Observant naturalists see... continual small-scale extinctions and replacements of local populations...".

To be fair to Darlington, he refers to previous papers of his own where these ideas are developed more fully, but the omission of quantitative and analytical examinations in examples like this make one realize the value they have in the totality of biology. This is why Darwin's contribution to biology was much more than providing a tidy filing system for animals and plants. Darwin was a naturalist in the highest sense of the word, but as a by-product of his evolutionary writings, he set in motion an examination of the natural world which has encompassed the methods of mathematicians and chemists as well as those of taxonomists and geneticists.

However, an outing with a good naturalist is always a stimulating experience, and Darlington is no exception. For example, he points out that paleontological discontinuities may represent real breaks in species distribution, and not merely artefacts of preservation, and that the character of the fossil record is a function of the habit of theoreticians of assuming that adaptations (such as particular reproductive strategies or feeding behaviours) are inevitably maximized—even Darwin recognized that

they were often imprecise or imperfect (De Beer called this "a principle of great importance").

I enjoyed *Evolution for Naturalists*. I shall read it again sometime, because I suspect that there are some important insights in it—but they will need digging out and testing, giving one the excuse for some "real biology" in contrast to accepting or re-testing the sophisticated conclusions of one's peers.

In contrast Philip Appleman's *Darwin* represents the worthwhile end of the American academic machine. It is a well-balanced collection of extracts from Darwin's own work, his commentators, and his intellectual descendants to the present day (ranging from Richard Owen and Adam Sedgwick to Lorenz, Leakey and Chomsky). Appleman is a Victorian historian at Indiana University, and his anthology has been chosen to show the development of ideas rather than alleged milestones in evolutionary science (in contrast to a seemingly endless stream of other American collections).

The book was first published in 1970. I do not recall seeing it before in Britain, although perhaps it has been on the history shelves in bookshops. Obviously it was well-received, for it has been reprinted through twelve printings in nine years. The second edition adds papers on sociobiology, the IQ debate, DNA research, primate work, and recent studies in paleontology. It is rounded off by two essays by Appleman himself—an Epilogue to the first edition ("Darwin and the changing of the mind"), and an interpretation of the controversies continuing in the 1970s ("Darwin among the moralists"). The book is worth acquiring for these essays alone: writers on evolutionary

history are usually either strident forward chroniclers or humbly backward-looking (such as John Muxley or C. H. Waddington). The only British exception I can think of is Gavin De Beer, and Willey, and more recently John Moore (*The Post-Darwinian Controversies*, Cambridge University Press, 1979).

Appleman points out that all the biological controversies of the past decade have a long history: biology and the IQ argument, the new versions of the determination debate; creationism is about authority; and intellectual freedom in research is at risk when restrictions are placed on research. Indeed, "Darwin's theory has been devoured from within by the rampant growth of the theory of the adult small, where in time it reproduces and generates new jellyfish. Which is then the predator and which the prey?"

Such biological conundrums give Thomas keen pleasure, which communicates itself vividly to the reader. He advertises frequently to the theme of symbiosis, and views our relation with our own cellular organelles, such as our intracellular energy generators, the mitochondria (which by their biochemical attributes are the descendants of primordial bacteria that set up home in our cells), in much the same light. It is this vein of symbiosis, to my mind, which is the best science writers of recent times, such as J. B. S. Haldane in his journalistic articles and Miriam Rothschild in her incomparable *Lice, Fleas and Cuckoos*.

Those in the new breed of scientists, including the very successful, are not necessarily the company one would choose to be stuck in a life with. Lewis Thomas is in a different tradition: he emerges from the pages of his books as a humane and engaging companion, and when, as his enthusiasm mounts, he hooks his finger through your buttonhole and proceeds to dilate on pheromones or computers in medicine, you will have to think to yourself, "This man, Oscar Wilde once said that to be intelligible is to be found out. Lewis Thomas shows in these essays that this dispiriting adage admits of exceptions, and for this we are all in his debt."

R. J. Berry

R. J. Berry is professor of genetics at University College London.

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Edward C. Cocking

Edward C. Cocking is professor of botany and director of biological studies at the University of Nottingham.

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This book on plant metabolism

but the choice of topics covered is somewhat bizarre. In a book with this title the student might reasonably expect to find a substantial amount of information on the effects of UV on animals and man, instead of which there is only one very short chapter on UV and cancer. The rest of the book describes effects of UV on microorganisms.

The first six chapters contain useful basic information for the student on physical aspects of ultraviolet radiation and ultraviolet lamps, measurement of doses, the products formed by the action of UV on DNA, ways of assessing the biological effects of the radiation and evidence that damage to DNA is responsible for most of the biological effects observed. In the subsequent chapters, however, unwarranted space is taken up with the description of rather obscure phenomena, many of which have only been observed in studies with bacterial viruses. The relevance of many of these phenomena, although they are of considerable historical importance, is somewhat questionable in the light of the findings of more recent research.

The importance of repair and recovery processes is quite rightly emphasized throughout the book, yet little space is devoted to the molecular mechanisms of these processes, a topic which would surely be of interest and importance to the student. The bibliography is mainly a list of historical references, with no citations to articles later than 1976. Although the book is not written for research purposes, surely a few citations of recent review articles would have been useful for those readers interested in pursuing the subject in greater depth.

The paperback edition is reasonably priced and, although some of the later chapters are likely to be of dubious value, this helpful information in the first few chapters will make it a useful volume for graduate students in microbiology.

A. R. Lehmann

A. R. Lehmann is at the MRC cell mutation unit, University of Sussex.

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Macmillan, £4.95

ISBN 0 333 23630 7

In recent years plant metabolism and plant biochemistry have undergone a major resurgence of activity. This has necessitated a reappraisal of the teaching of these subjects to biology students and to the large numbers of students in the biological sciences who have little acquaintance with these fundamental aspects of modern biology.

There are of course many textbooks available covering these subjects, but the real need is to have a concise text that will excite the interest of students, because it is relevant, and which the student will be likely to purchase. Increasingly, students are realizing the importance of their own small contribution to the body of knowledge in the field of plant metabolism.

This book on plant metabolism

fully meets the requirements. Many students find plant metabolism a difficult subject to comprehend, particularly since in many of the more general texts on metabolism and biochemistry it is relegated as secondary to animal metabolism. Plant metabolism is often presented merely as a highly complicated series of inter-connected metabolic reactions, and this book avoids this major pitfall by relating these activities to cell structure and the major metabolic functions of plants fundamental to life—namely, photosynthesis and nitrogen metabolism.

Perhaps the most striking feature of this book is that Kumar and Singh have been able to present such a succinct account in little over 300 pages.

The style of writing is clear and straightforward, and the numerous line drawings help in understanding the concepts at the end of chapters. References to original papers, rather than to general review articles, is also a commendable feature in this type of book.

Edward C. Cocking

Edward C. Cocking is professor of botany and director of biological studies at the University of Nottingham.

## BOOKS

## Of meningococci and men

**The Lives of a Cell: notes of a biology watcher**

by Lewis Thomas

Allen Lane, £5.95

ISBN 0 7139 1350 9

**The Medusa and the Snail: more notes of a biology watcher**

by Lewis Thomas

Allen Lane, £5.95

ISBN 0 7139 1349 5

Lewis Thomas, paediatrician, immunologist, director of the Sloan-Kettering Institute for Cancer Research in New York, and elder statesman of the American medical establishment, wrote the essays which make up these two volumes originally in the book of essays for the *New England Journal of Medicine*. The essays were directed towards the medical world, but have found their way into the hands of a wider audience.

Such biological conundrums give Thomas keen pleasure, which communicates itself vividly to the reader. He advertises frequently to the theme of symbiosis, and views our relation with our own cellular organelles, such as our intracellular energy generators, the mitochondria (which by their biochemical attributes are the descendants of primordial bacteria that set up home in our cells), in much the same light. It is this vein of symbiosis, to my mind, which is the best science writers of recent times, such as J. B. S. Haldane in his journalistic articles and Miriam Rothschild in her incomparable *Lice, Fleas and Cuckoos*.

Those in the new breed of scientists, including the very successful, are not necessarily the company one would choose to be stuck in a life with. Lewis Thomas is in a different tradition: he emerges from the pages of his books as a humane and engaging companion, and when, as his enthusiasm mounts, he hooks his finger through your buttonhole and proceeds to dilate on pheromones or computers in medicine, you will have to think to yourself, "This man, Oscar Wilde once said that to be intelligible is to be found out. Lewis Thomas shows in these essays that this dispiriting adage admits of exceptions, and for this we are all in his debt."

R. J. Berry

R. J. Berry is professor of genetics at University College London.

## Deep affection for the natural world

**Observations of Wildlife**

by Peter Scott

Phaidon, £7.95

ISBN 0 714 820 415

Adjusted to a world of electric light and an ever-darkening sky, few of us are out about at dusk. Thus we miss the pleasurable and sometimes rather amazing sensation of having the world to oneself, the freshness of the dawn when the only activity of waking birds and the extraordinary colours—greens, pinks and yellows—of the new-lit sky. Those qualities of colour and of mood are captured by many of Sir Peter Scott's paintings and, though they are not primarily to do with the natural world, they are a reflection of the landscape and of the way in which the artist's mind works during a trip to Israel and realize that even Sir Peter can capture a great deal with a Sardinian warbler.

The text of the book is fairly short and lightweight. It is composed of a series of short pieces, each dealing with a different aspect of the natural world. The book is a collection of short pieces, each dealing with a different aspect of the natural world. The book is a collection of short pieces, each dealing with a different aspect of the natural world.

John Andrews

John Andrews is head of the conservation planning department at the Royal Society for the Protection of Birds.

pendant for cytology and an admiration for Metamorphosis.

Thomas is at his best when he is ruminating on the ways of nature and its aberrations; on our normally peaceful coexistence with the meningococcus; on the gratuitous evolution of the diphtheria toxin gene, which is expressed only in the sickly, sick of a phage and under the direction of the intruder; and on the weirdly intertwined careers of medusa, the jellyfish and the nudibranch snail, whose larval offspring swim into the tentacles of the adult medusa and are engulfed in its body. The jellyfish then devoured from within by the rampaging larvae; as they mature and grow their host is trimmed down until nothing remains of it but an appendage close to the mouth of the adult snail, where in time it reproduces and generates new jellyfish. Which is then the predator and which the prey?

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Walter Gratzner

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all the crucial acts of living. . . . But even so, if the transformation is a coordinated, integrated physiologic process in its initial stages, there is still that persistent vanishing of consciousness to be accounted for. Are we to be stuck forever with this problem? Where on earth does it go? Is it simply stopped dead in its tracks, lost in humus, wasted? Considering the tendency of nature to find uses for complex and intricate mechanisms, this seems to me unnatural. I prefer to think of it as somehow separated off at the filaments of its attachment, and then drawn like an easy breath back into the membrane of its origin, a fresh memory for a biospherical nervous system, but I have no data on the matter.

It is a curious fact that the catastrophic advance of science in the past two decades has been accompanied by an ever more shameful failure on the part of its practitioners to explain their activities to their benefactors, the tax-paying public. There is perhaps an irony here to the fact that the very science which has brought us the economy gets better everything else gets worse—a proposition which evidently does not commute with its converse. Our Victorian predecessors, for example, saw it by contrast as their duty and privilege to expound their discoveries and impart their pride and pleasure in them to all who would read or listen: the chasm between the two cultures had not yet been discovered.

Most of the new breed of scientists, including the very successful, are not necessarily the company one would choose to be stuck in a life with. Lewis Thomas is in a different tradition: he emerges from the pages of his books as a humane and engaging companion, and when, as his enthusiasm mounts, he hooks his finger through your buttonhole and proceeds to dilate on pheromones or computers in medicine, you will have to think to yourself, "This man, Oscar Wilde once said that to be intelligible is to be found out. Lewis Thomas shows in these essays that this dispiriting adage admits of exceptions, and for this we are all in his debt."

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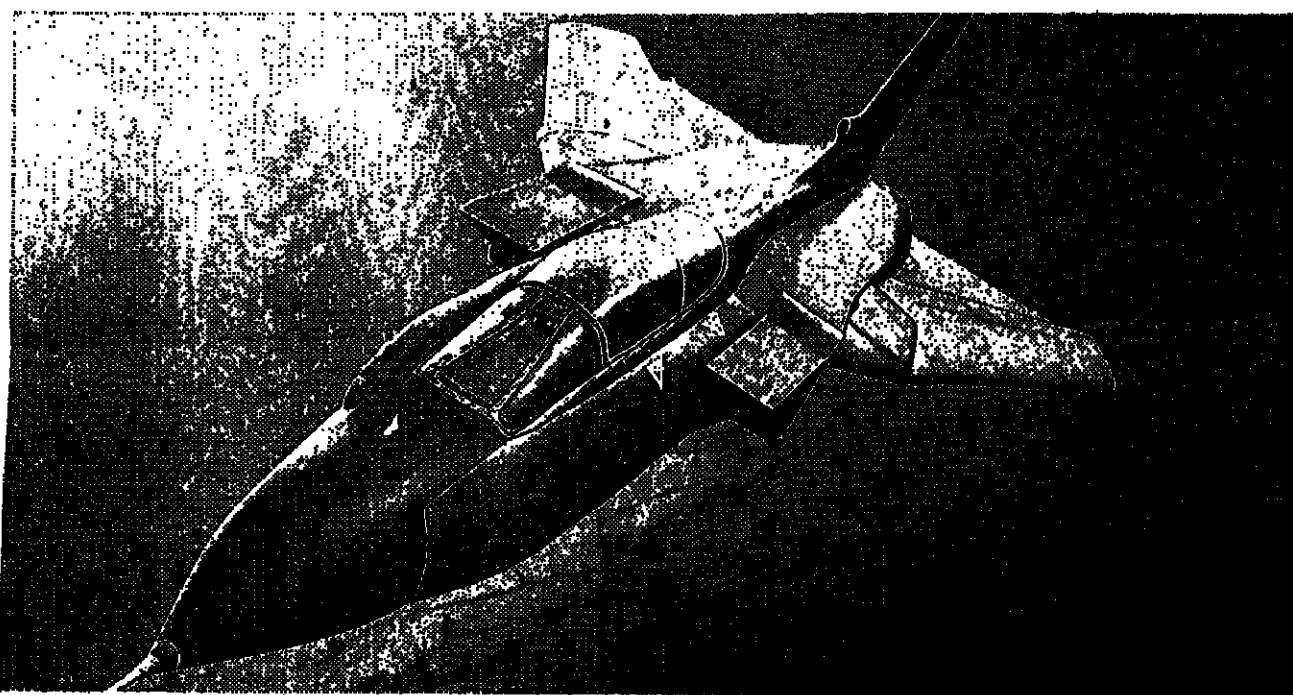
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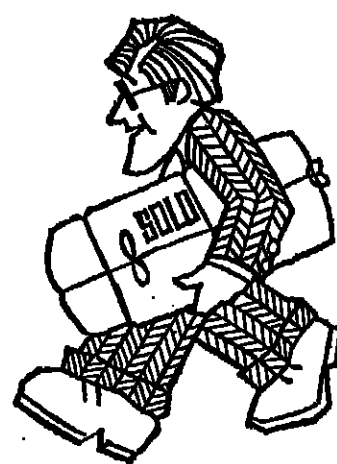
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## Union View

Observations  
from another  
world

When Len Murray left Downing Street with his general council colleagues after meeting the Prime Minister recently, he spoke about what had transpired in No 10. The TUC view was that Mrs Thatcher had laid great stress on her concern about unemployment, but had not committed herself to any action to alleviate it or to halt the lengthening queue. Her argument was, apparently, that due processes had to be gone through, that what had to be done was to get the unemployment (to others, of course), nothing could be done just now, the time was not ripe.

It is true that the time is never right for doing some things. As a class of phenomena, the "not just yet" tasks are met with at all levels in every walk of life. They also seem to have a set pattern of characteristics. First, it is generally accepted that the tasks are inevitable, in that they will have to be performed sooner or later. Secondly, pressures to get the job done usually arouse cries of genuine, heartfelt concern and promises to act soon. Thirdly, all these tasks are evaded by reference to a list of excuses, which grows in inverse proportion to the real will to do the job.

The excuses tend to fall into well-defined categories—there is a lack of money, there is a lack of time, for proper consideration or preparation there are more pressing priorities just now—you have heard it used these lines a thousand times. Procrastination, caution, call it what you will; the effect is always the same. The job is put off once more "until tomorrow," today's best labour-saving device.

In the international scene it used to be independence for the colonies, now it is help for the third world. All the ingredients are there. The generally held view that one day there will be a fairer sharing of the world's wealth; the frequent public statements on commitment to the idea of more aid; and then the excuses of why we cannot try harder to save the starving millions.

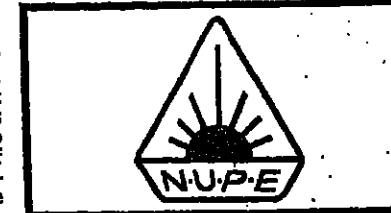
The reduction in the working week is likely to be another bone of contention this winter. I applied to the university employers who, last year, took a first step, however cau-

just now. "Let's put our own house in order first, to be the more able to help some time in the future, when the time is more appropriate, etc. etc."

Nearer to home it might simply be that bloody tap that is dripping, or the clutch that is slipping a little. "Yes, they will have to be attended to sometime, but, but..."

Between these two ends of the spectrum fall the great mass of jobs that can and must be tackled, but not today. Over the last decade in Britain, low pay and a reduced working week have been classic examples. Although there are many others in collective bargaining for university manual and ancillary workers, both these issues have led to a great deal of resentment and frustration.

The take-home pay for an hour's work by these, your university colleagues, would scarcely pay for two pints of lager in most pubs. The actual rates range from £1.36 to a



mind-blowing £1.72 an hour before stoppages such as income tax (no signs of V to Vestey here!) and the like. Two years ago we asked for a minimum rate of pay of £1.50 an hour or £60 a week, equal to two-thirds of the national average wage. Even now, we still have not reached that £60 figure. The current two-thirds formula would mean an increase to £80 a week, £2 an hour before stoppages.

We can guess the excuses for non-action this year: the economic climate, the not wishing to set precedents, the hands tied by the Government. The hands will presumably be tied to the hilt by our plight as we are told. "Of course low pay is totally unacceptable, we agree that the Clegg Commission led to only a 6 per cent increase in total earnings for manual workers, we really must do something about this when the time is right."

The reduction in the working week is likely to be another bone of contention this winter. I applied to the university employers who, last year, took a first step, however cau-

tious, by conceding a reduction to a 39-hour week for manual workers from November, 1980. But we can already hear some with the same old excuses—commitment to the principle of further reductions, and acceptance that while new technology, massive unemployment, and rising expectations, plus the fact that other university employees have a better deal, a 35-hour week is very reasonable, it is not possible just yet.

On both these issues, low pay and the shorter working week, the tears for the less privileged are regarded cynically by our people when the condition of work of other groups, not least those on the "other side" and their peers. Our argument is the same as that for index-linked pensions and for a national superannuation scheme. We are reminded of the school dinner table where the server always seemed to have the largest portion of the limited resources in the chip bowl. At least he did not bleat about how much he felt the kid at the bottom of the table needed a fairer treatment and a larger meal.

I am not asking for our masters to stop talking of their concern, but to go further than their "we would if we could" attitude and match their actions to their words. Not when times are more auspicious, not when there is more money available, not when things are brighter. Not when this generation of manual workers has retired or expired, but now.

Let us have an autumn of understanding. Try to understand what it is like to live on less than £55 per week; to understand what hostile feelings grow from disparate treatment and from the lie of equal percentage increases. But whether or not it is a winter of common sense, let us see some progress. Do not put it off again. Let us see some action.

Mr Murray said that it was not simply two nations, but that Downing Street and Congress House were worlds apart. It has been pointed out to me that Tavistock Square is not far away and might, therefore, not even be in our universe.

Is there anybody out there listening?

Rodney Bickerstaffe

The author is a national officer of the National Union of Public Employees and secretary of the trade union: side of the Universities Central Council for Non-Teaching Staff.

Education redefines its student-march, moving away from the automatic gearing of content and method to the 18 to 24-year-old student. It provides an increasingly appropriate first-step in the process of life-long education.

All of this is not to suggest euphoria or over-optimism. Much still needs to be done if the counter-productive dichotomy between continuing and higher education is to be avoided. The "re-entry" problem of students who come back into post-A level courses after years away from study are still underestimated. The Nuffield Foundation last year funded a study of the problems here. In Sunderland, focus groups of adult educators with the need for tailor-made learning materials.

This showed that a preliminary "induction" period for such students is quite inadequate—that the learning and personal problems persist far beyond the early months. It is in such areas that the assistance to staff whose work has previously been mainly with the 18 to 21 group. And yet, as I began by saying, antagonisms are developing among the very groups on whose concerted efforts the development of a continuing education system worthy of the name depends.

The term "front-end model" is borrowed, I believe, from the jargon of life insurance. Few methods are so revealing, rather fatalistic, assumptions about the life-span of the average continuing education student. Such assumptions are unfounded. Given the right start, a student will leave higher education but never, of intellectually moribund, but eager to continue his or her education. Without a reformed "front-end", there is really going to be a market for continuing education?

Roy Cowell

The author is Dean of the Faculty of Humanities at Sunderland Polytechnic.

## Don's diary

## Sunday

Off to Leningrad in a foul temper; the Soviet Consulate has granted me a visa strictly for the duration of the European Cosmic Ray Symposium and not allowing the two extra days I had asked for. I shall have to cut conference sessions to see Leningrad. Furthermore the London Intourist Office proved less than helpful in arranging hotel accommodation, did not reply to letters, and the travel agency had to tele Moscow—at my expense. I succeeded in picking up my hotel vouchers at the check-in counter, one hour before take-off where I arrive by taxi, as the much advertised London underground service to Heathrow is not operating before 8.15 on Sundays.

Arrive warily at Leningrad Airport to be agreeably surprised by the efficient and friendly reception organized by the local Intourist in cooperation with the Symposium Organizing Committee. Customs officials are greatly interested in my baggage, but one of them expresses interest in the slides brought by a colleague who finds himself prompted to give the customs a short lecture on the origin of cosmic rays. Transport here, on by the committee, is excellent. The Baltic designed by Soviet architects and built by a Swedish consortium.

## Monday

Conference opens with an address by Academician Vernov, now 70, still very much in charge of Russian cosmic ray research. The Men from the Ministry emphasize Soviet policy to have distinguished scientists, fundamental and applied, on the staff of Polytechnical Institutes. He believes that the interaction of cosmic ray research with space physics, nuclear physics and biology and the accompanying technology, simply reinforces this policy. The survey of the cosmic ray field is given by Academician Ginzburg. Cosmic ray research, often pronounced exhausted and dying in the past, has entered a new phase with the arrival of X-rays and gamma-ray astronomy. X-rays has become more quantitative and more alive as a result of Theories (and controversies) abound, e.g. about cosmic ray origin and acceleration.

Are physicists the greediest lot of mankind? The rate at which food stores will disappear at the evening reception ought to be measured! The mean free path between colleagues wanting to meet again is far too large compared with that between colleagues and wine bottles and food dishes.

## Tuesday

A rearrangement of the programme owing to the absence for various reasons of some invited speakers! There is an excellent simultaneous translation system at the plenary sessions in the morning, breaking down only when in the heat of discussion speakers do not use the microphones. All speakers use translators giving the gist of their lectures in English. Quite obviously some of them have not been teaching students for years, judging by the way they plonk themselves fitfully between screens and audience, obscuring diagrams and text.

Manage to slip away into town to buy a Russian fur hat. There is a convenient metro station, but since I have just one hour only I am glad to be given a lift in an Intourist car accompanied by Yuri, a young research at the Institute. There is not much choice in the foreign currency shops, but the second shop has a hat reasonable in price and acceptable in look and style.

## Wednesday

Lively discussion at the morning's plenary session: what is the origin of cosmic rays? Contrary to popular belief supposedly, sober, and

objective scientists can become subjective, passionate and not averse to disregarding some unpleasant facts if they do not fit with preferred theories. Also, a bit of chauvinism does not come amiss if it can assist your advancement. Nobody questions the excellence of Soviet research in the cosmic ray field; yet it jars when a slide showing the present state of the art in measuring the highest cosmic ray energies omits the pioneering results of the Leeds Haverah Park group. Is this done to impress the Academicians present with the achievements of one Russian group? Fun and games, too, when the Durham-Leds collaboration group talk about cosmic ray origin. What about the rays now known to come from outside our galaxy? We are told that these come from the next nearest galaxy, but for this to be so interaction probabilities have to be bent a bit to fit the model. And what about the missing energy balance?

## Thursday

In the plenary session the leaders of two Russian groups very acceptably exceed their briefs to give survey papers and report exciting new results in the field of high energy interactions. Here cosmic rays serve as probes to test nuclear reactions at energies well above those presently available at accelerators. Astronomy we hear of exciting new experiments now being prepared and which employ a highly sophisticated new imaging technique.

I have an opportunity to speak to Academician Vernov, whom I have not seen since the Munich Conference of 1975. He tells me that he has been very ill and required immediate surgery so urgent that there was no time for him to go to Moscow for the operation. I wonder whether this remark reflects on the unavailability of medical treatment in the Soviet Union and that the best medical treatment is available only in Moscow. The two French colleagues at this conference are eager to confirm this; they tell me what can only be described as a horror story of their own experience. In a motor accident near Rostov one of them suffered open fractures in both legs, but received no proper treatment in the local hospital, and it took two weeks of negotiations at the highest diplomatic level before he obtained a visa allowing him to leave the Soviet Union and to be transported to a hospital in France. His companion suffered a skull fracture and brain damage, which was not diagnosed until he had arrived back in France.

## Friday

Theoreticians' field day, mainly on cosmic ray acceleration. I get away early to have another look at Leningrad. The conference ends after lunch and there is an excursion to Petrodvorets (Peterhof), the Tsar's summer residence. We go either by hydrofoil on the Neva or by bus driving through miles of new housing estates. The guide tells us that after a needless and wanton destruction of the palace, the summer residence has been reconstructed and the final touches have been added only last year.

## Saturday

An excursion is laid on to see the gold and other treasures, ancient and modern, in the Hermitage. Another opportunity to see the Palace Square roundabout with the transport is laid on to take us to the airport after lunch. Two hours before departure are required to complete all the formalities of the check-in. The Swedish crew awaits us in the plane. Today's papers: We are back in a different world.

E. W. Kellermann

The author has just retired from the post of senior lecturer in physics at Leeds University.

John Co. 136



